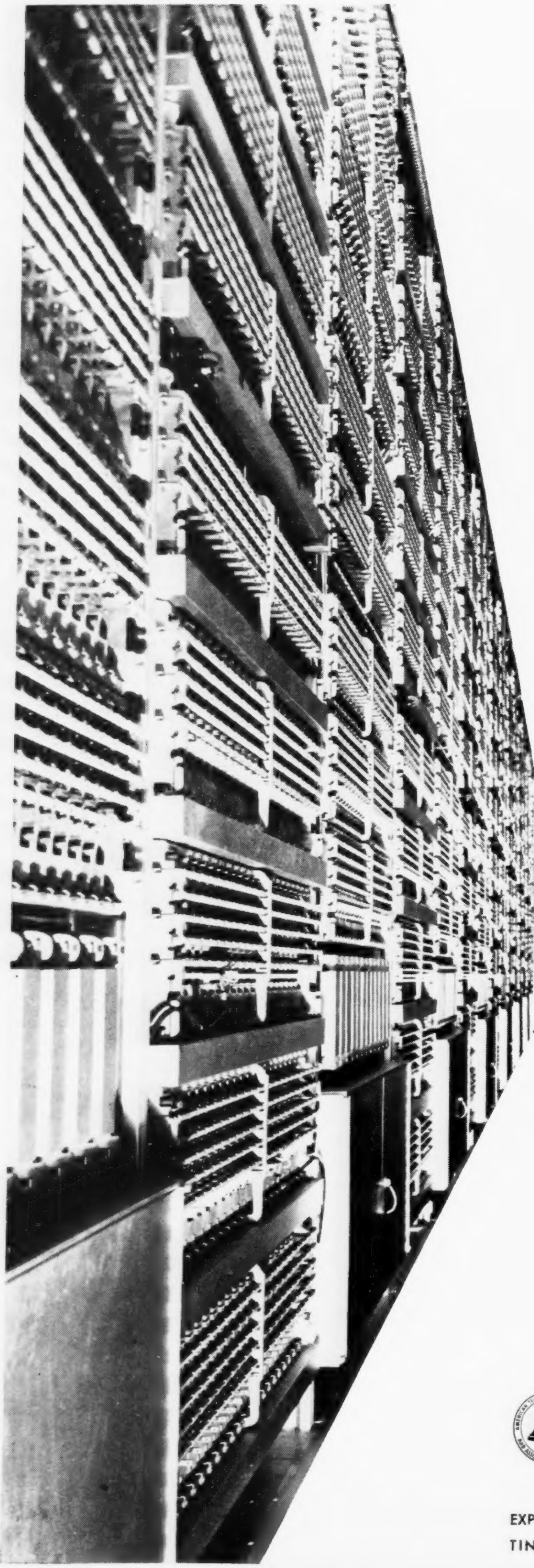
INDIA

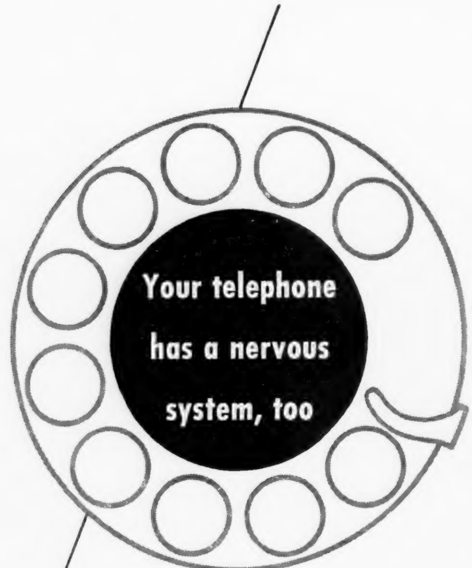
RUBBER WORLD

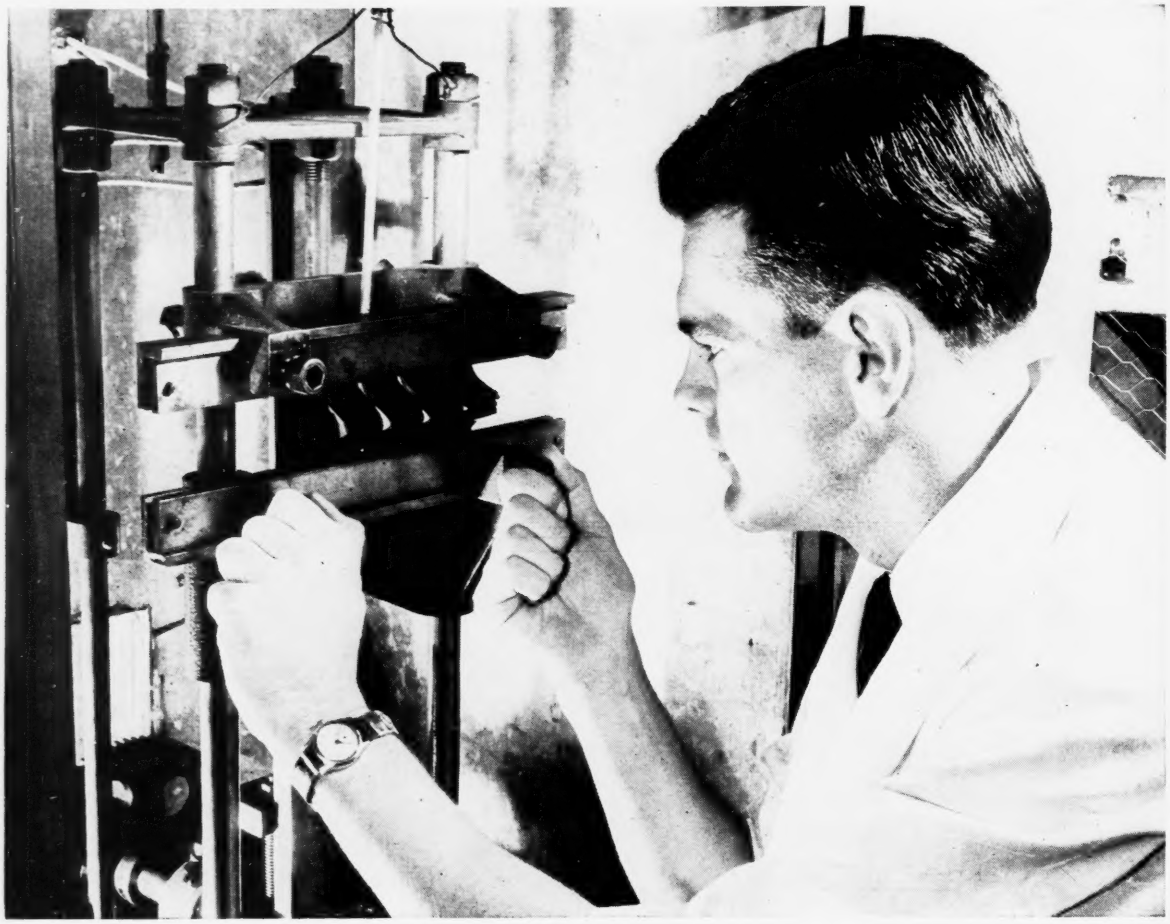
NTHETIC

MAY, 1947

INDIA RUBBER WORLD, May, 1947, Vol. 116, No. 2. Published Monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, Orange, Conn., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as Second-Class Matter at the Post Office at Orange, Conn., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per Year; All Other Countries, $4.00; Single Copies 35 Cents. Address Mail to New York Office.




Your telephone
has a nervous
system, too

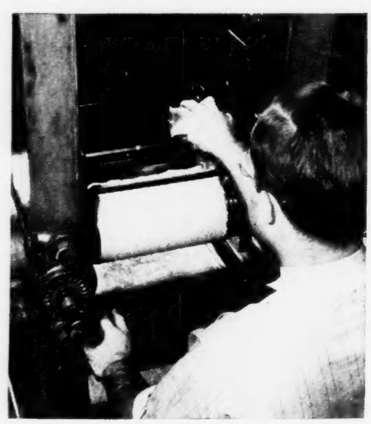


YES, WE TEST FOR TOUGHNESS!

While our prime interest in rosin rubber is the production of Dresinate* 731—the essential emulsifier developed by Hercules in cooperation with the rubber industry — we are also concerned with the performance of the finished rubber formulations. Thus, our rubber laboratory is constantly engaged in producing, testing, and evaluating experimental copolymers made with this ingredient.

We welcome the opportunity of working with manufacturers of tires and other rubber products.

HERCULES POWDER COMPANY 914 Market Street, Wilmington 99, Del.



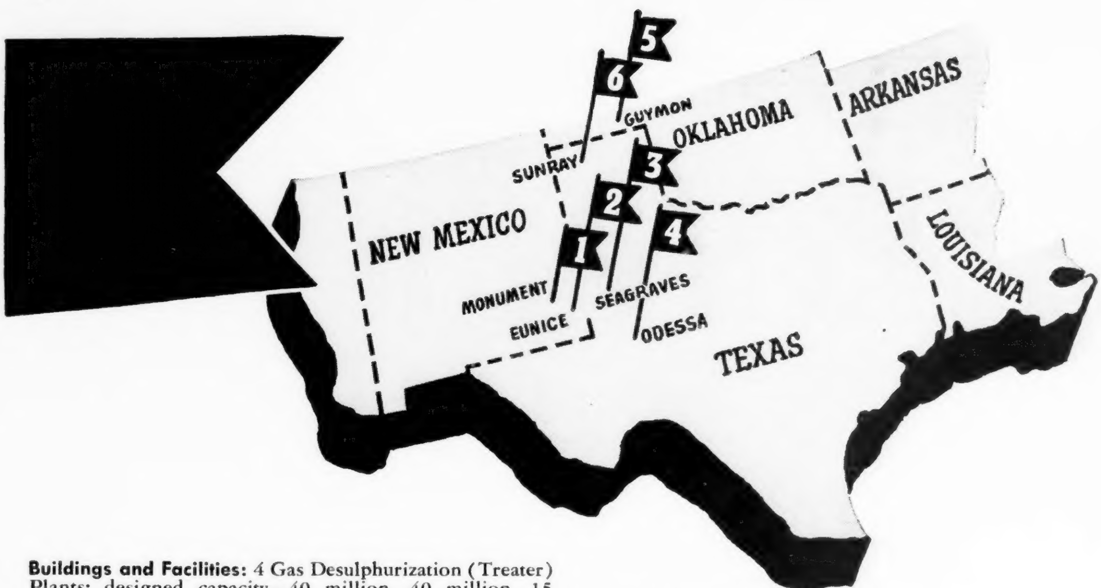
Photograph taken at the Hercules rubber laboratory.

HERCULES DRESINATE 731

THE EMULSIFIER THAT MADE ROSIN RUBBER

*Reg. U. S. Pat. Off. by Hercules Powder Company

R7-2



Buildings and Facilities: 4 Gas Desulphurization (Treater) Plants; designed capacity—40 million, 40 million, 15 million, 10 million cubic feet of gas per day. Gas Supply Lines—2 complete Carbon Black Plants. No. 1—one Burner Unit, consisting of 44 Burner Houses, 12′ x 144′ x 9′ and 3 Burner Units, each consisting of 44 Burner Houses, 12′ x 148′ x 9′. Processing, storage and miscellaneous accessory buildings and equipment. No. 2—4 Burner Units, each consisting of 60 Burner Houses 12′ x 148′ x 9′. Processing, storage and miscellaneous accessory buildings and equipment, and one incomplete, partially erected Carbon Black Plant. No. 3—most of material for 2 Burner Units, each consisting of 60 Burner Houses, 12′ x 148′ x 9′. Most of material for processing, storage and accessory buildings and equipment. Dwellings —4 at each Treater Plant Site and 72 at Odessa, Texas.

Land: Approximately 425-3/4 acres.

For Sale or Lease—(A) As a whole, for operation at the present location; (B) as a whole, less incomplete Plant No. 3 at present location; (C) any appropriate combination of treater plants, burner units, accessory buildings and equipment for operation at the present location.

For Sale—(D) As a whole, except dwellings, for dismantling and removal; (E) incomplete Plant No. 3 for dismantling and removal; (F) any appropriate combination of treater plants, burner units, accessory buildings and equipment for dismantling and removal from site; (G) dwellings to be offered separately if remainder of plancor is sold for removal.

Gas Supplies: Gas is now being supplied by Phillips Petroleum Company, Cities Service Oil Co., and Odessa Natural Gasoline Co., under contracts with the present lessee that run through 1949 with contingent extension.

For a more detailed description of this property write: War Assets Administration, Office of Real Property Disposal, North American Aviation Plant, Grand Prairie, Texas.

5.

GUYMON, OKLAHOMA
(Plancor 2317)
CABOT CARBON COMPANY

Buildings and Facilities: 4 Burner Units, each consisting of 48 Burner Buildings, 13′ x 124′ x 15′. Other buildings, Processing Shop, Warehouse and Service Buildings and equipment, 20 frame dwellings.

Land: Approximately 59-1/4 acres.

For Sale or Lease—(A) As a whole, for operation at present location; (B) less 2 burner units and accessory buildings and equipment for operation at present location, or—

For Sale—(C) As a whole, except dwellings, for dismantling and removal from site; (D) 2 burner units, appropriate buildings and equipment for dismantling and removal; (E) dwellings only, if remainder of plancor is sold on a removal basis.

Gas Supplies: Gas is now being supplied through facilities of the Gas Division of Cabot Carbon Company. Cabot Carbon Co., has expressed willingness to negotiate with prospective operators of the plant for necessary gas supplies.

For a more detailed description of this property write: War Assets Administration, Office of Real Property Disposal, 2000 N. Memorial Drive, P.O. Box 1409, Tulsa, Okla.

6.

SUNRAY, TEXAS
(Plancor 2277)
CONTINENTAL CARBON COMPANY

Buildings and Facilities: 6 Burner Units, 4 consisting of 42 Burner Houses each, 12′ x 160′ x 9′, 1 of 40 Burner Houses and 1 of 20 Burner Houses. Processing, storage and miscellaneous accessory buildings and equipment. 14 dwellings near Carbon Black Plant. Total all buildings, approximately 475,777 sq. ft.

Land: Approximately 155 acres.

For Sale or Lease—(A) As a whole, for operation at present location; (B) as a combination of burner units plus appropriate accessory buildings and equipment for operation at the present location, or—

For Sale—(C) As a whole, except dwellings, for dismantling and removal from site; (D) any combination of burner units plus appropriate accessory buildings and equipment for dismantling and removal from site; (E) dwellings to be offered separately if remainder of plancor is sold for removal from location.

Gas Supplies: Gas is now being supplied by Shamrock Oil and Gas Corporation under a month-to-month contract with the present lessee.

For a more detailed description of this property write: War Assets Administration, Office of Real Property Disposal, N. American Aviation Plant, Grand Prairie, Texas.

Prospective lessee or purchaser should arrange to obtain his own gas supplies. 1125-T

GOVERNMENT OWNED SURPLUS PLANTS

WAR ASSETS ADMINISTRATION

OFFICE OF REAL PROPERTY DISPOSAL

Technical Bulletin No. 32 on the Compounding of GR-S with Substantial Loadings of ZINC OXIDE

Experimental Polymer XP-8 with 100 Parts of Zinc Oxide

XP-8 is defined by Office of Rubber Reserve as follows:

Monomers—	Butadiene	70
	Dichlorostyrene	30
Formula—	Activated—low soap	
Modifier—	Sulfole DDM Mixture	
Temperature—	95° F.	
Mooney Plasticity—69		

COMPOUND NO. 32

Polymer	100.0
Sulfur	2.5
"El-Sixty"	1.5
"Monex"	0.2
Coumarone-indene Resin	7.5
E.L.C. Magnesia	5.0
ZINC OXIDE	100.0

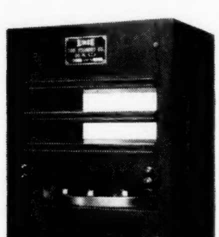
ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength (psi)	Per Cent Elongation	Modulus Load (psi) for Elongation of: 200%	300%	400%	500%	Permanent Set	Shore Hardness	Tear Resistance Tested at: Room Temp.	100°C.
XP-8										
4	3100	760	235	275	390	590	.28	50	70	36
7.5	3200	710	265	305	455	725	.25	51	75	38
15	3040	690	270	310	460	770	.21	51	75	38
30	2680	670	270	350	505	775	.20	51	78	39
45	2580	670	275	350	470	785	.17	51	74	37
60	2480	640	275	315	470	745	.16	51	78	38
90	2520	670	270	350	465	700	.16	51	75	39
GR-S										
4	1470	610	225	380	530	795	.23	50	65	34
7.5	1455	590	225	335	525	860	.21	50	62	34
15	1300	560	230	305	495	800	.19	50	60	32
30	930	510	235	350	545	855	.13	50	57	31
45	1115	535	230	345	540	845	.14	50	55	29
60	1195	550	225	335	485	825	.15	50	56	29
90	1130	540	265	340	490	865	.14	50	55	30

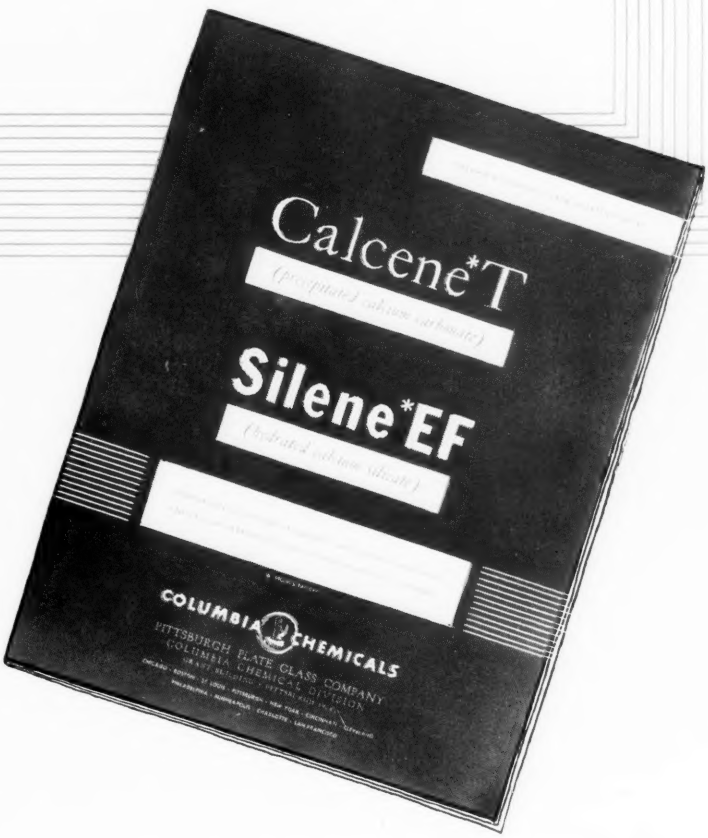
Time of Cure Min. at 45 Lb.	Goodyear-Healey Pendulum: Indentation in mm.	Per Cent Rebound	Shore Hardness	Compression Fatigue (Goodrich Flexometer)*: Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression: Initial	Final	Cut-Growth Resistance Tested at 70° C. Inches Failure: 300 Cycles	1000 Cycles
XP-8										
60	7.47	60.6	51	25.7	15′-2.9	31.6	15.4	17.9	.34	.78
GR-S										
60	7.64	61.2	49	27.5	18′-4.8	36.8 (At 15′ 35.4)	18.1	23.0	.52	—

* Test Conditions: 143 Lb. Load. 0.175″ Stroke. 100° C. Oven Temp.

XP-8 gives, with Zinc Oxide, the highest tensile results obtained to date with any modification of the GR-S type polymer. The modulus at 300% elongation follows standard GR-S quite closely, as does the permanent set at break. However, *XP-8* is appreciably better in tear resistance at both room temperature and 100°C. The pendulum rebound of *XP-8* is slightly lower than Standard GR-S, but the heat generation is somewhat better. The cut-growth resistance of *XP-8* is distinctly better than Standard GR-S.



GR:S physical properties improved with mixtures of Calcene T and Silene EF



Data recently compiled show favorable physical properties can be obtained in GR:S stocks with proper proportions of Calcene T and Silene EF.

DATA AVAILABLE ON REQUEST

The results of various formulas are reported in Columbia Pigments Data Sheet No. 47-4. Copies will be furnished at your request.

CALCENE T is a specially prepared, coated, precipitated calcium carbonate of fine particle size. It confers high tensile strength, resistance to tear and abrasion, low modulus, smooth, fast extrusion and good general processing properties to natural and synthetic rubber stocks.

SILENE EF is a finely divided, precipitated, hydrated calcium silicate—the nearest approach to a "white carbon black." It confers high modulus, hardness, tear resistance and good tensile strength up to high loadings in natural and synthetic rubbers.

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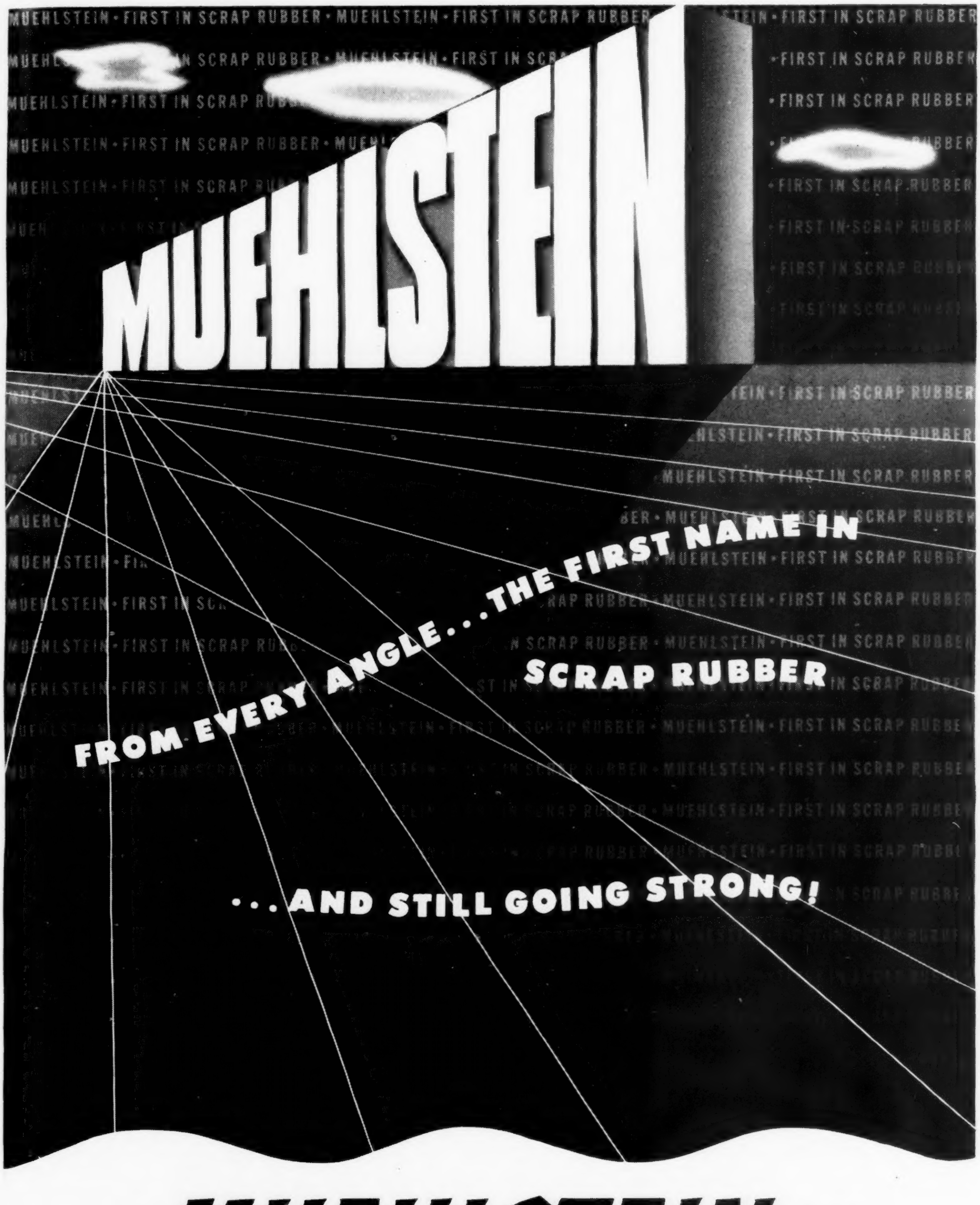
MUEHLSTEIN • FIRST IN SCRAP RUBBER
MUEHLSTEIN
FROM EVERY ANGLE . . . THE FIRST NAME IN
SCRAP RUBBER
. . . AND STILL GOING STRONG!

LET'S LOOK INTO A 3A BANBURY'S PROCESSING ABILITY

To help you decide whether the special qualifications and capacity of this intermediate size Banbury fit efficiently into your processing set-up, here is a brief summary of what it can do.

With a net chamber capacity of 4315 cubic inches, the 3A Banbury mixes batches of 100 to 115 lbs. of 1.25 specific gravity stock, 120 to 140 lbs. of 1.50, and 160 to 180 lbs. of 2.00 specific gravity stock.

Special design and construction adapt this machine admirably to the processing of a wide variety of synthetics and plastics. Intensive Banbury rotor action mixes the most resistant materials thoroughly, and controls are provided to simplify correct operation and assure consistent, high quality production.

Valves and gauges for various temperature regulating circuits are mounted on a panel at the operating platform. By manipulating them, it is an easy matter to bring the batch temperature to the desired point and keep it there. An electrically actuated potentiometer pyrometer, with its thermocouple in direct contact with the batch, indicates and records temperature on a chart.

A telechron timing device fitted with instruction charts, signals the operator as each step of the mixing cycle is completed.

Complete details of this machine or of any of the other production units listed on this page will be sent promptly on request.

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ANSONIA, CONN.

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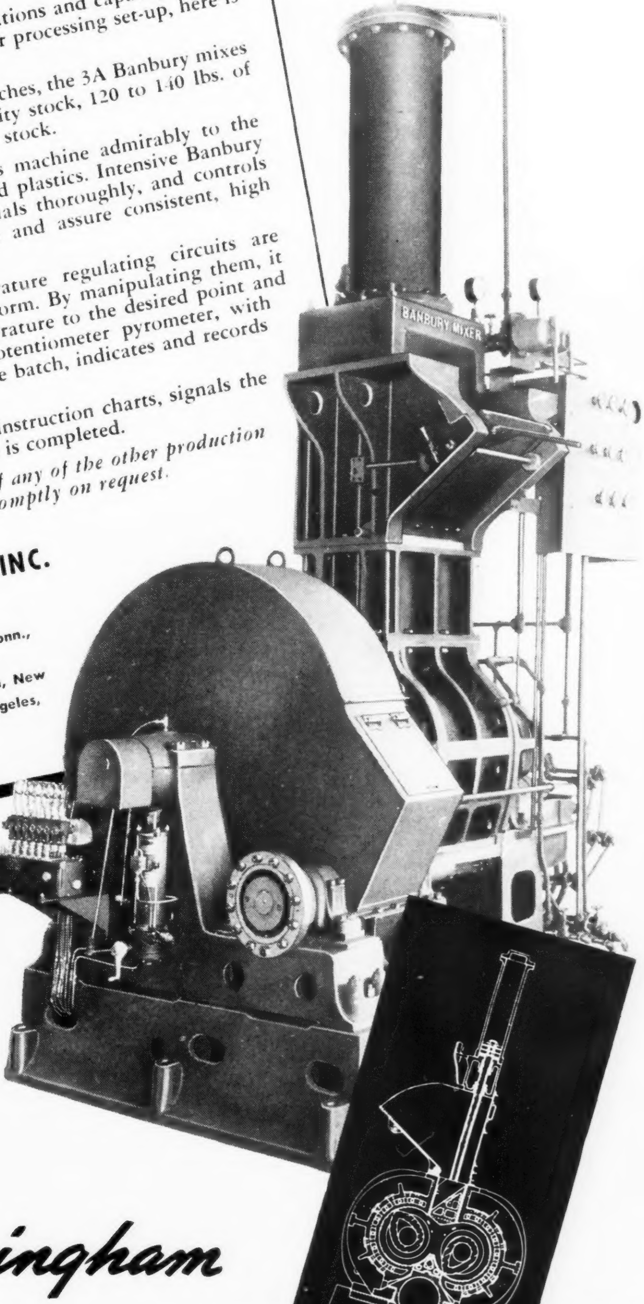
Sales Offices: Ansonia, Buffalo, Stonington, New York, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston, Charlotte



Farrel-Birmingham

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Banbury Mixers • Plasticators • Pelletizers • Mixing, Grinding, Warming, and Sheeting Mills • Bale Cutters • Tubing Machines Refiners • Crackers • Washers • Calenders • Hose Machines Hydraulic Presses and other equipment for processing rubber and plastic materials.

FB-388

May, 1947

Volume 116 Number 2

A Bill Brothers Publication

INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

Published monthly by Bill Brothers Publishing Corp. Office of publication, Orange, Conn. Editorial and executive offices, 386 Fourth Ave., New York 16, N. Y. Chairman of Board and Treasurer, Raymond Bill; President and General Manager, Edward Lyman Bill; Vice Presidents, Randolph Brown, B. Brittain Wilson, C. Ernest Lovejoy.

Subscription price—United States and Mexico, $3.00 per year; Canada, $4.00; all other countries, $5.00, as of July 1, 1947. Single copies, 35¢. Other Bill Publications are: GROCER-GRAPHIC, PREMIUM PRACTICE, RUG PROFITS, FOUNTAIN SERVICE, TIRES Service Station, Sales Management.

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INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

Volume 116 — New York, May, 1947 — Number 2

World Economic Trends and the Future of Synthetic Rubber

William F. Zimmerli

Affiliated Photo—Conway

DR. ZIMMERLI is exceptionally well qualified to discuss the future of the American synthetic rubber industry from both the viewpoint of the industrial chemist and the industrial economist. A graduate of the Polytechnic Institute of Brooklyn, he received his doctor's degree in chemistry and physics from the University of Heidelberg, Germany, in 1912. He was employed by The B. F Goodrich Co., Akron, O., from 1912 to 1914 and again from 1924 to 1928, being concerned during the latter period with the development of production of tires. From 1914 to 1916, Dr. Zimmerli was assistant professor of chemistry at the University of Akron, and from 1919 to 1924 he was technical director of the Howe Rubber Co., New Brunswick, N. J., where he did pioneering work in the development of balloon-type tires.

Then from 1928 to 1942, Dr. Zimmerli held positions of responsibility with E. I. du Pont de Nemours & Co., Inc. One of the most important of these positions was that of European technical representative from 1933 to August, 1939, with headquarters in London, England. During this period he kept the du Pont Company research and development divisions informed of European developments, including local political and economic factors, studied research organization and planning in Europe, and was responsible for the supervision of du Pont sponsored research in laboratories abroad. In 1942, after the United States entered the war, another broad assignment was a study of the impact of the war on the du Pont company's economic, technical, and development activities and a study of the utilization of the company's developments, facilities, etc. in the postwar period.

Dr. Zimmerli left du Pont in 1942 when he was appointed by the Alien Property Custodian to staff and organize the research, development, and patent departments of the General Aniline & Film Corp., a former subsidiary of the I. G. Farben interests in Germany. As a vice president of General Aniline, he charted a coordinated long-term research and development program for expansion of the company's activities.

Since 1945, Dr. Zimmerli has been an independent chemical consultant with offices at 270 Park Ave., New York, N. Y.

—EDITOR

WORLD trends in industrial expansion and in reorientation of world economies demand increased attention by American business executives to long-term planning. Developments in the postwar world, as chaotic conditions subside, will greatly affect operations both in this country and abroad. The pattern is beclouded in every field, and especially so with regard to the future of the synthetic rubber industry in the United States.

The estimated prewar production capacity for natural rubber of about 1,800,000 long tons, far in excess of actual world consumption, the unexpected large shipments of natural rubber following the end of the late war, and consumer preference for tires made from natural rubber have all contributed toward the relaxation of national interest in the importance of synthetic rubber to the American economy on a long-term basis. The problem of what to do with our synthetic producing facilities is complicated by the fact that natural rubber production in 1948 may be considerably more than prewar world consumption. There is grave danger that such a situation may do much to discourage consideration of the future of synthetic rubber in the United States.

As a contribution to the overall picture, probable developments in the field of world economics and world industrial activity are presented here as being of importance both to the government in developing policies on synthetic rubber for the immediate future and to the individual companies in the rubber and associated industries as a possible aid in making plans for the long-term period.

Future World Conditions

Predicting the future of world conditions is extremely difficult because of the confused economic and political situation existing throughout the world. However, there are only two choices—the world does not stand still—

PAST, PRESENT, AND FUTURE CONSUMPTION OF RUBBER

	Population in Millions*	Consumption 1000 Long Tons		Consumption Lbs. per Capita		Potential Consumption 9.9 Lbs. per Capita 1000 Long Tons	Potential Consumption U. S., 9.9 Lbs. All Other Countries 4.5 Lbs. per Capita 1000 Long Tons	Estimated World Natural Production Capacity 1000 Long Tons
		1927†	1937‡	1927	1937			
United States	123	371	543.6	6.76	9.90	544	544	
Canada	11	26.4	36.1	5.36	7.36	44	22	
United Kingdom	46	45.3	95.7	2.22	4.85	200	100	
Germany	70	39.5	98.2	1.26	3.14	310	155	
France	42	32.0	60.0	1.71	3.19	186	93	
Italy	43	11.9	24.0	.60	1.12	200	100	
Russia	183	12.7	30.5	.15	.37	810	405	
Other European countries	185	13.9	76.1	0.18	0.92	817	409	
Japan	72	18.4	62.2	0.57	1.93	320	160	
Australia	12	8.9	48.9	1.67	9.15	53	27	
Total	789	580.0	1075.7	Average 1.67	Average 3.05	3484	2015	1800
Other Countries		1.5	8.2					
Asia except Japan and Russia	1000	negligible		negligible		4420	2210	
Asia Minor, North and South Africa	110	negligible		negligible		485	243	
Central and South America	127	negligible		negligible		560	280	
Additional Consumption						5465	2733	

*Population figure for 1927 used for all calculations. Relative proportionality of figures would be changed little by using 1937 figures, and present-day figures are not available.
†From report on rubber for 1927-28 by Hymans Kraay & Co., London, England.
‡From "Commodities for Industry," 1940 Edition, Commodity Research Bureau, Inc., New York, N. Y.

the industrial age will either continue its growth, or this growth will be retarded. If the growth of the industrial age declines, any plans we might now make and execute, based on the probability of continued progress, will be of no consequence, and we will merely have some extra insurance which will not be necessary. On the other hand, if the world-wide growth of the industrial age is accelerated, a marked effect on our national economy should result. More particularly, any advance in the world standard of living, so as to approach our own even moderately, should increase greatly the world's consumption of rubber.

That the long-term world trend toward a higher standard of living is probable is indicated by a broad objective consideration of the primary causes of the late war. The social and political unrest throughout the world in the decade before the start of World War II was a manifestation of an irresistible demand on the part of the people of other countries for a higher standard of living such as we have in the United States. The many ideologies, including Communism, Naziism, Fascism, Togoism, and socialism, as well as various forms of governmental planned economy, all promised their supporters a higher standard of living. The failure of these ideologies to accomplish this purpose within their individual economic units led to war. All of the aggressors openly declared that their major objective was to form large economic units by conquest in order to satisfy the demands of their people for a higher standard of living such as the industrial age can provide. If a large part of the industrialized people of the world were willing to risk destruction to attain this objective, the failure to attain it through conquest will not halt this demand all over the world. The Far East is in the throes of an economic revolution; Russia is expanding her plans of industrialization, and the people of the United States are demanding even greater participation in the fruits of the industrial age.

Effect of World Trends on Rubber Consumption

That there was a definite trend in world expansion of industry before the late war can be most clearly demonstrated by a study of world rubber consumption. The accompanying table shows rubber consumption in various parts of the world for the years 1927 and 1937 and indicates that in spite of the world depression, wars, and the political and social unrest between 1927 and 1937, the consumption of rubber doubled. For comparative studies the table includes the per capita consumption of rubber in different countries of the world. This ranged in 1937 from 9.9 pounds in the United States to 0.37-pound in Russia. To indicate the potentialities for the consumption of rubber if there is a continuation of the trend of world-wide industrial expansion, the table also includes calculations of rubber consumption in various parts of the world and total world consumption, if the United States remains constant at 9.9 pounds per capita and other parts of the world consume rubber at an equivalent rate, and also if the United States remains constant at 9.9 pounds and the rest of the world uses rubber at a rate of 4.5 pounds per capita.

Obviously, these figures cannot be accepted as representing with any degree of certainty just what the consumption of rubber will be in any or all parts of the world at some future time, since it is impossible to predict the amount of industrial expansion that will actually take place. However the United States, which consumed 544,000 long tons of rubber in 1937, probably will use in 1947 slightly less than the 1,000,000 long tons consumed in 1946. Even a moderate increase in the standard of living in Russia or Asia should result in a considerably greater volume of consumption of rubber for these areas and for the world as a whole. It is, therefore, reasonable to assume that some time in the not-too-far-distant future the world demand for rubber will approach the world production capacity for natural rubber. As this situation develops, the narrow gap between supply and demand will produce a definite trend toward increasing the price of natural rubber to the point where the manufacture of synthetic rubber would become a profitable venture for private enterprise in the United States.

Another factor of considerable importance in connection with the economics of the production of natural, as compared with synthetic rubber, is the effect on the cost of natural rubber production of an increase in the standard of living in the natural rubber producing areas. Because of the higher proportion of labor effort required with natural rubber, even a very minor increase in the standard of living of the natives engaged in its production would very materially add to the production cost to the

(*Continued on page 207*)

Moisture Transfer to and from Tire Cords Encased in GR-S[1]

W. James Lyons[2], Hilda M. Ziifle[3], Mary L. Nelson[3], and Trinidad Mares[3]

THE efficiency with which the rubber enveloping the cord in a tire retards the diffusion of moisture into or out of the cord assumes importance because of the dependence of the strength and other mechanical properties of the cord on its moisture content. The matter is doubly significant in the comparison of cotton with rayon tire cords because the effect which absorbed moisture has on the strength of one of these cords is opposite to the effect on the other cord. Generally cotton cords increase in tenacity with increased moisture at least at the lower ranges; while rayons show a sharp decrease as they take up moisture.[4] Thus, depending on the permeability of tire rubber to atmospheric moisture, either type of cord in a tire may be brought to a more or a less favorable condition, merely by the humidity conditions of storage or service. One aspect of the general problem concerns the ability of the outer layers of rubber in a tire to prevent a change in the moisture which is in the cord at the time the tire is molded.

To procure exploratory information on the magnitude of the effects involved it was decided to measure the absorption or desorption of moisture in simple units in which new fabric of known weight was encased in tire rubber, the experiments to be conducted at extremes of humidity. In the same laboratory the problem was approached from another direction by Wakeham, Honold, and Portas,[5] who made moisture determinations on cords removed from actual tires which had been exposed to various humidities.

Absorption Observations

Thin Rubber Pads

The usual methods for measuring the moisture permeability of wax paper, cellophane, etc., did not appear to simulate sufficiently conditions in a tire where fabric and rubber are molded together in intimate contact. Furthermore, while such methods had been used by Taylor, Hermann, and Kemp[6] with considerable success to study the water permeability of thin rubber sheets, it was questionable whether sufficient quantities of moisture would be transferred through relatively thick layers of rubber in an acceptable period of time, to be detected by these methods. Hence a method was devised in which pads or blocks of rubber, each encasing a piece of dry fabric of known weight, would serve as permeability cells and could be stored in a humid or arid atmosphere. The expectation of a small moisture transfer through the rubber dictated the use of extreme humidity conditions so that maximum changes in weight due to moisture could be recorded.

Selected for the present tests were three different tire fabrics:

- Co-1445, SxP cotton, 22.75/4/3 cord, spun at Southern Regional Research Laboratory
- Co-1446, A commercial rayon, 1100/2, 480 denier singles
- Co-1447, Cotton, commercial fabric

The fabric samples were cut into squares about five inches on a side and were then placed into weighing bottles, in which they were dried and weighed. They were kept in the bottles until the moment for molding in the rubber. The stock for the latter was a GR-S tire-carcass material obtained from a commercial manufacturer of tires, rolled to a thin sheet and cut to fit a six by six-inch mold. Each fabric sample was molded between two rubber sheets (at 287° F. for 30 minutes), producing a pad about 1/8-inch thick, with a margin of solid rubber about 1/2-inch wide around the edges of the embedded fabric. To provide control measurements of the moisture absorbed by the rubber in the pads, a six by six-inch pad of solid rubber was also molded. On completion of each cure, the pad was placed into a desiccator over anhydrous $CaCl_2$ to cool to room temperature, after which it was weighed. With this procedure the dry weight of rubber and fabric could be accurately known. The pad consisting of pure rubber and the one containing the commercial fabric, Co-1447, were molded in duplicate, to provide checks in the moisture measurements. In Table 1 the actual dry weight of the rubber in each pad is given, along with the original dry weight of the fabric.

TABLE 1. INITIAL DRY WEIGHTS OF RUBBER AND CORD FABRIC IN THIN RUBBER PADS

Pad	Encased Fabric	GR-S (Grams)	Fabric (Grams)
"B"	None	74.110	....
"C"	Cotton, Co-1447	75.883	8.832
"D"	Rayon, Co-1446	77.869	5.693
"E"	Cotton, Co-1445	81.397	7.729
"F"	None	77.574	....
"G"	Cotton, Co-1447	81.537	8.260

The dry pads were placed on racks over water, in desiccator jars, thus being at approximately 100% relative humidity. Temperatures were in the range 75 to 77° F. Daily, at first, the pads were removed individually from the jars and weighed to determine the absorbed moisture. The progressive absorption of moisture was followed for about 200 days in Pad "B", the solid rubber pad, and Pads "C", "D", and "E", containing fabrics Co-1447, Co-1446, and Co-1445 respectively. Pads "F" and "G", the duplicates of "B" and "C", were kept in another jar; their gains in weight were recorded for a period of about 160 days. Toward the end of the storage periods, when the trend of the moisture absorption had become quite well established, weighings were made weekly.

The results on each of the pads, expressed as moisture regain in percent. of the dry rubber weight, are shown graphically in Figures 1 and 2. It will be seen that after the initial induction period the absorption of moisture tends to become linear with time, in all of the pads, and is still proceeding after 200 days in the humid atmos-

[1] Presented before the joint meeting of the Fiber Society and the Division of High Polymer Physics, American Physical Society, Charlottesville, Va., Sept. 26, 1946.
[2] Resigned from Southern Regional Research Laboratory, U. S. Department of Agriculture, Apr. 24, 1945.
[3] Southern Regional Laboratory, U. S. Department of Agriculture, New Orleans, La.
[4] For examples, see J. H. Dillon and I. B. Prettyman, *J. App. Phys.*, 16, 159 (1945).
[5] H. Wakeham, E. Honold, and H. J. Portas, India RUBBER WORLD, 113, 659 (1946).
[6] *Ind. Eng. Chem.*, 28, 1255 (1936).

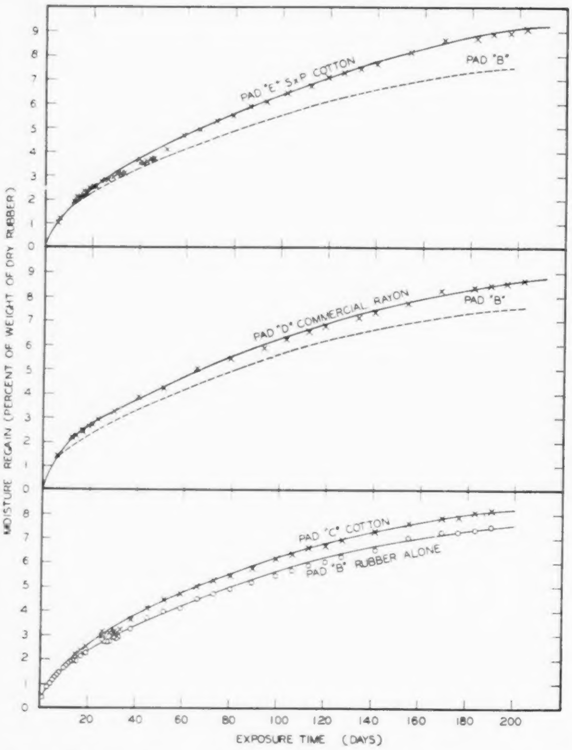


Fig. 1. Moisture Regain of GR-S Carcass Stock Pads Containing Cotton and Rayon Fabrics, Stored at 100% R.H. in Jar with All-Rubber Pad "B"

phere. There is sufficient downward trend to the slopes of the curve in the graphs, however, to suggest that the moisture regains are approaching a saturation value. While the general shape of the curves suggests a logarithmic relation between regain and time, a graphical test proves that this relation does not prevail.

As has been indicated, all the pads (both those containing fabric and those wholly of rubber) were of the same external size and shape. With the rubber pressed around and between the cords, the single layer of fabric in the pads was effectively of negligible thickness. Table 1 shows the mass of rubber displaced by the fabric specimens to be so small as to be masked by other experimental variations. Thus we may suppose that the overlying layers of rubber in the fabric-containing pads provided the same spatial conditions for the penetration of moisture into the rubber as was provided by the two layers of rubber on either side of a hypothetical middle plane in the all-rubber pads. The presence of a hydrophilic material at the middle plane evidently introduces differences between water-vapor flow in one system and that in the other, in spite of the geometric equivalence. It has been supposed, however, that this factor diminishes in importance as equilibrium is approached, and that even over the whole period of moisture absorption, a reasonable, approximate indication of moisture conditions in the rubber surrounding the fabric would be given by the moisture-absorption history of the all-rubber pads.

Accordingly, from the smooth curves in Figures 1 and 2 values of moisture regain at various times were re-

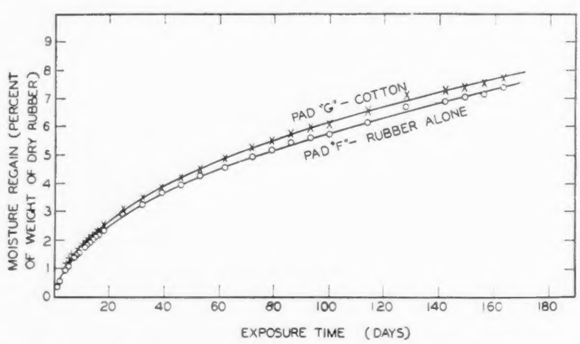


Fig. 2. Moisture Regains of GR-S Carcass-Stock Pad "G" Containing Cotton Fabric and All-Rubber Pad "F", Stored Together at 100% R.H.

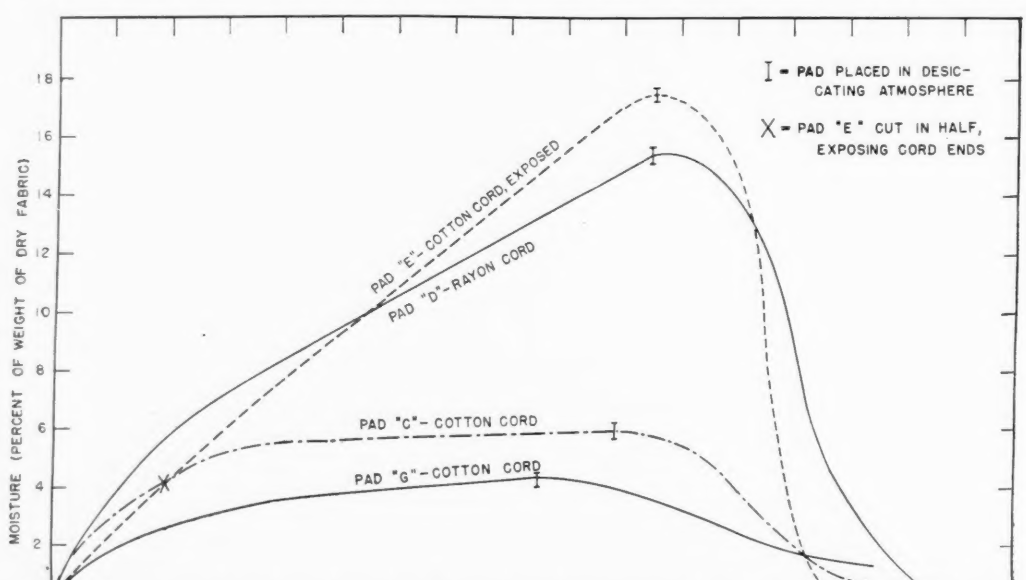


Fig. 3. Moisture in Fabrics in GR-S Tread-Stock Pads First Exposed to 100% R.H. and Then Transferred to Jars Containing $CaCl_2$

corded for each pad. The differences between these values and those for Pad "B" or Pad "F" at corresponding times, were then plotted. Through the plotted points smooth curves were drawn, representing the moisture taken up *by the fabrics*, expressed in percent. of the dry weight of rubber in each pad. By multiplying the ordinates of these graphs by the ratio of dry weight of rubber in the pad to dry weight of fabric, the basis for expressing moisture regain was converted to percent. of weight of dry fabric. The curves for the first 160 to 200 days in Figure 3 were thus obtained. These being derived curves, there are no appropriate "experimental" points to plot.

In Figure 4 are shown for comparison the moisture regains of bare fabrics exposed for 20 days to approximately 100% relative humidity. The specimens used here were from the same samples as those embedded in rubber, discussed above. The comparison of these results with those in Figure 3 brings out clearly the retarding effect of the enveloping rubber on the moisture absorption.

It will be observed that the linear character of the curves in Figure 3 after the induction period is more marked than in those of Figures 1 and 2. This practical linearity would seem to be due to the high absorptive capacity of the fabric, which is indicated in Figure 4. The moisture absorbed by the rubber embedded fabrics, even at 200 days, is still much below the amount they are capable of absorbing. The moisture in the rubber, on the other hand, may be supposed to be approaching its saturation value after 200 days, thus accounting for the diminishing slope of the curves for the whole pads in Figures 1 and 2. The well-known fact that rayon is more hygroscopic than cotton is reflected in the results shown in Figure 3. After 200 days the regain of moisture transmitted through the rubber is about 15% of the cord for rayon fabric (Pad "D") and about 5% of the cord for cotton (Pads "C" and "G"). The differences between the curves for Pads "C" and "G" have no known significance other than non-uniformity between the specimen materials. The ordinates in Figure 3, it must be remembered, represent small differences between comparatively large, observed quantities. As Figures 1 and 2 show, most of the moisture taken up was absorbed by the rubber envelopes, though, because of the mass of rubber in each pad, this moisture after 200 days amounted to only about 8% of the dry rubber weight.

In the Pads "C," "D," and "G" the moisture absorbed by the fabrics had to traverse layers of rubber about 1/16-inch thick on either face of the fabric. However in Pad "E," which was cut in half after being in the humid atmosphere for 39 days, the cord ends were exposed directly to the moist air, affording immediate access of the water molecules to the fabric. The result is indicated in Figure 3 in the steep ascent of the moisture-regain curve for this pad.

Desorption measurements on these same pads are discussed below.

Rubber Blocks

The foregoing results indicated that a test piece consisting of fabric encased in rubber provided a feasible means for obtaining a measure of the permeability of rubber to water vapor. The results can be interpreted with reference to cord in a tire with less artificiality than can the conventional permeability tests. It was recognized, however, that in the flat pads the thinness of the rubber layer separating the cord from the ambient atmosphere provided a somewhat more favorable condition for the transfer of moisture than prevails for most of the cord fabric in a typical tire. Accordingly, to bring the experiments into closer semblance with a tire, it was decided to prepare test pieces in which the wall of rubber encasing the cord would be substantially increased. It appeared also that a larger ratio of fabric to rubber than had been used in the thin pads would be more representative of the proportions in a tire, especially of the heavy-duty type.

In planning the experiment to utilize the most suitable available mold, it was decided that the rubber test-blocks be three by four by one inch, and that they initially contain a rectangular cavity in which a bundle of cord would be placed. It was estimated that after curing, the cord bundle would be surrounded by a wall of rubber from 1/4- to 1/2-inch thick. While this type of test piece would provide the desired relations between fabric and enveloping rubber, it was recognized that unlike the case of the thin pads, the moisture conditions in the rubber of the blocks could not be duplicated even approximately by those in an all-rubber block. An appreciable volume of the block would be occupied by the cord and void spaces in the bundle. It was thought, however, that it would be instructive, yet not inconvenient, to carry along in the experiment some all-rubber blocks, to secure an indication of the moisture behavior of a compact mass of GR-S, as contrasted with that of a thin pad.

Two cords, as follows, were used in preparing the test blocks for this part of the study:

Co-752, Stoneville 2B cotton, 23/4/3 cord, spun at Southern Regional Research Laboratory

Co-1766, Rayon, high tenacity, 1100/2, furnished by commercial manufacturer

Estimates were made of the lengths of cord required, and when these were cut each cord was wound into two compact bundles. The bundles were placed into weighing cans, dried for two hours at 105° C., and weighed in the conventional manner. In order to reach a judgment as to whether the cords would pick up an appreciable amount of moisture on transfer to the mold in the subsequent curing operation, the bundles (after the above-mentioned determinations) were exposed for one hour to the air of the room in which the mold was to be loaded. On reweighing the bundles, it was found that during exposure the average rate of absorption was seven mg./min. for the cotton, and six mg./min. for the rayon, or approximately 0.02% regain/min. for either fiber. While it was recognized that the initial rate would be higher, it was concluded that with rates of this order of magnitude, no appreciable error due to absorbed moisture would be introduced during the building of the rubber blocks. After this test the cords were redried and again weighed, with the results given in Table 2. They were kept in the dry condition until molded in the test blocks.

TABLE 2. INITIAL DRY WEIGHTS OF RUBBER AND CORDS IN RUBBER BLOCKS

Block	Encased Cord	GR-S Grams	Cord Grams
"H"	Cotton, Co-752	151.502	37.209
"I"	Rayon, Co-1766	161.588	35.143
"J"	Rayon, Co-1766	159.300	35.387
"K"	Cotton, Co-752	162.061	37.589
"L"	None	120.981	....
"M"	None	122.145	....

The rubber used for the blocks was a GR-S stock from the same source as that used in the above-described experiments. The stock was rolled to a thickness of 1/4-inch and cut to fit a mold cavity six by eight by one inch, after the weight of raw stock required to give a full mold on curing had been predetermined. Four layers of the rubber sheet were used; the middle layers

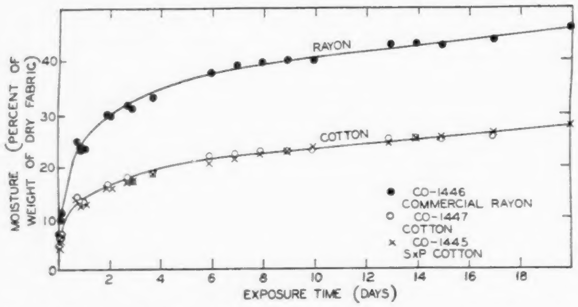


Fig. 4. Moisture Regain of Bare Fabrics Used in Present Experiments, Exposed to 100% R.H.

had rectangular openings two by three inches into which the four bundles of fabric were placed. The mold was preheated for 30 minutes and was loaded and closed as quickly as possible to minimize absorption of atmospheric moisture by the cords. After a 45-minute cure at 287° F. the rubber was tested for hardness with a durometer. An undercure was indicated; so the rubber was further cured for another 45 minutes at the same temperature; the hardness then was found satisfactory. This large molded slab was cut into quarters approximately three by four inches, each containing a bundle of the sample cords. The cords were thus encased in walls of rubber from ¼- to ½-inch thick. Precautions were taken, as in the experiments with the thin pads, to keep the blocks dry before they were finally weighed.

From these weighings, together with the weights of the cords previously obtained, the data in Table 2 were derived.

From a slab of solid rubber cured in the same mold under the same conditions, two blocks about two inches square by one inch were cut. These, blocks "L" and "M," were used to obtain measurements on moisture absorption by the rubber. Their dry weights also are entered in Table 2.

The conditions of storage of the six blocks at approximately 100% relative humidity, as well as the weighing procedure, were essentially the same as those described for the thin pads. Observations were made on all blocks over a period of more than one year.

The results are presented graphically in Figure 5. Since they would be of no help in the better location of the curves, but rather would obscure each other, the plots of several of the observations on each block made in the early days of the experiment have been omitted. The moisture regains calculated for the solid rubber blocks "L" and "M", for each of the days on which readings were made, so closely duplicated each other that their plots over most of the range were indistinguishable on the graph. Accordingly, one curve is used to represent the data for both blocks. The rather large discrepancy between regains in blocks "H" and "K" containing cotton cord, like that between Pads "C" and "G," must be charged to non-uniformity.

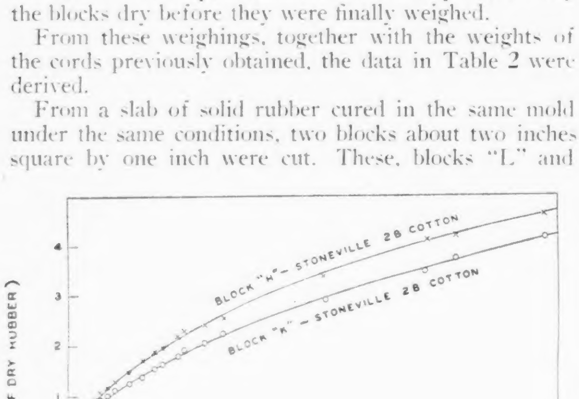


Fig. 5. Moisture Regain of GR-S Tread-Stock Blocks Containing Cotton and Rayon Cords, and Containing No Cord, Stored at 100% R.H.

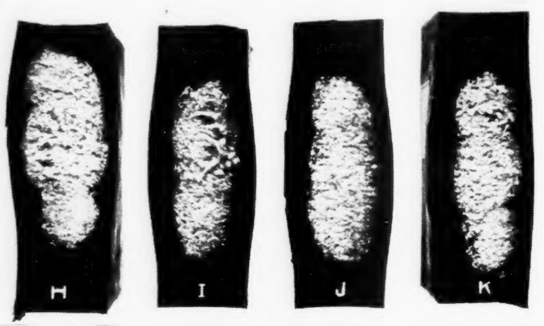


Fig. 6. Half-Sections of GR-S Carcass-Stock Blocks, Showing Arrangement of Cotton and Rayon Cords in Rubber; The Blocks Were Cut at Mid-Section after Completion of the Moisture Absorption Experiment

While Figure 5 is useful in showing the trends of moisture absorption in a thick rubber-and-fabric structure, the data reproduced there, as has been indicated, were not suitable for estimating moisture regain in the fabric, as was done for the thin pads. A direct determination of fabric moisture was made on all four blocks containing the cotton and rayon cords, after 492 days of storage. The blocks were cut open; cord was pulled from one half of each block, placed into a tared moisture dish, and weighed immediately. The time elapsing between cutting and weighing was probably less than one minute, so that the moisture regains thus found are believed to be those of the embedded cords to good approximation. The results are given in Table 3;[7] while sectional views of the cut blocks are shown in Figure 6.

TABLE 3. MOISTURE REGAINS OF CORDS REMOVED FROM RUBBER BLOCKS EXPOSED TO 100% RELATIVE HUMIDITY FOR 492 DAYS

Block	Fiber	Moisture Regain %
"H"	Cotton	6.6
"I"	Rayon	7.2
"J"	Rayon	7.7
"K"	Cotton	5.6

The moisture regains for the rayon here are in contrast to the 15% shown in Figure 3 by the rayon cord of

[7] It is of interest to note that use, on the data for 488 days in Figure 5, of the estimation method used on the thin pads when applied to rubber block samples, gives 6.7 and 5% regains for cotton (Blocks "H" and "K," respectively) and 4.0 and 4.1% for rayon. The agreement with Table 3 on cotton is surprisingly good.

pad "D" at only 200 days. There is tolerable agreement, however, between the regains in the cotton cords removed from the cut blocks and those deduced from observations on the thin pads. In fact, results in Table 3 on cotton cords, indicating about 6% moisture regain after 492 days, confirm a suggestion from the results on the cotton cord in pad "C," indicated in Figure 3, *viz.*, after about $5\frac{1}{2}$% moisture regain is attained, the rate of absorption drops sharply to a very small value. Both regain values agree fairly well with the 5.0 to 6.6% moisture regains found by Wakeham and co-workers[5] in the well-encased outer plies of cotton-fabric tires stored under conditions comparable to the present ones. These data suggest that as the regain of the embedded fabric reaches a certain value (apparently about 6% for cotton), the difference between vapor pressures in the humid ambient air and at the fabric, driving moisture through the rubber, is reduced to such an extent that it is nearly or wholly counterbalanced by hydrophilic forces in the rubber envelope. Thus a state might be reached where slowly declining hydrophilic forces in the rubber permitting only slow diffusion of moisture to the fabric are in near-equilibrium with the pressure head, also slowly declining because of the absorption of moisture by the fabric.

Conclusions on Moisture Absorption

It is not possible to derive from the results of the present experiments a reliable quantitative law regarding the dependence of water-vapor permeability of GR-S on thickness. One reason is that the amount of moisture transmitted through the rubber in a given time of exposure depends on the material of the fabric, as Figure 3 shows.

Secondly, the thin pads and the blocks which would provide different wall thicknesses on which to base calculations, also differ in shape and in proportions of fabric and rubber. These factors independently influence moisture transmission significantly.

An indication of the influence of increased thickness of rubber on moisture penetration is given by comparison of the lower graph in Figure 5 with that of pad "B" in Figure 1. Thus the thin rubber pad "B," $\frac{1}{8}$-inch thick, absorbed 7.5% moisture in 200 days; while the blocks "L" and "M," eight times as thick, but only 1.6 times as massive, absorbed only 2% moisture in the same time. The exposed specific area (area per unit mass of rubber) was, of course, much greater in the pads than in the blocks, being approximately 6.5 and 1.2 sq. cm./gm., respectively.

Permeability measurements, such as were made by Taylor, Hermann, and Kemp,[6] involving unidirectional flow through natural rubber sheets, indicate that thick samples are not so impermeable to moisture as the inverse-thickness law would indicate. Nevertheless a substantial reduction in moisture penetration is achieved when the thickness of rubber is increased and the surface-to-volume ratio is decreased, as comparison of the present results on the solid rubber pads and blocks, as well as on rayon in Figure 3 and Table 3, indicates. We may still expect that the moisture content of fabrics in heavy bus and truck tires, having a thicker outside layer of rubber protecting the fabric, would be much less responsive to ambient moisture conditions than would that of fabrics in passenger-car tires.

Desorption Observations

Alternating with periods of service in which tire fabrics tend to pick up moisture are periods in which the tendency is for the moisture content to drop. This situation arises when tires are run at temperatures above, say, 200° F. To the extent allowed by the water-vapor permeability of the encasing rubber, the moisture contents of the fabrics and their dependent mechanical properties will reflect the alternations in the ambient humidity conditions. Because of the numerous factors entering into the moisture-transmission behavior of the rubber-fabric system, it cannot be concluded *a priori* that the rate of desorption of the fabric in a desiccating atmosphere will be the same as that of absorption. To obtain experimental information on this phase of the problem, measurements were undertaken on the loss of moisture by rubber-encased fabrics placed in desiccators.

The six pads, labeled "B" through "G," which had been stored at 100% relative humidity in the above-described tests, were transferred to desiccators charged with calcium chloride. The air in these jars may be assumed to have quickly attained a relative humidity within a few percent, of zero. The pads, after being put into the desiccating atmosphere, were weighed daily at first, but in the latter part of the experimental period they were weighed weekly. The present experiment covered a period of 101 days. As in the moisture-absorption experiments, the amount of moisture remaining in a pad on a particular day, considered as moisture regain, was converted to percentage of the weight of the dry rubber. The results, so treated, are presented graphically in Figure 7.

It will be seen that the pads of rubber alone reached practical equilibrium with the dry environment in about 35 days; while at the end of 100 days the moisture in all pads dropped to 0.25% or less. The slower rate of loss of moisture in the pads "C," "D," "E," and "G" is evidently associated with the presence of the fabric in them. However the difference on a particular day between the ordinates of the two curves in each panel of Figure 1 is not to be taken directly as the moisture in the fabric on that day. Actually, some of the moisture represented by this difference must be in the rubber, for (except in pad "E," which was cut in half) all the moisture lost by the fabric must transpire through the rubber. This is to say, in effect, that the moisture in the rubber in pads "C," "D," "E," and "G" does not actually follow the curves for pads "B" and "F," but, rather, curves lying between the two which appear in each panel of Figure 7. Thus there is no increase in fabric moisture for the first 10 or 20 days, as would be the apparent conclusion if the mere differences in ordinates were taken as fabric moisture. The increases in these differences during the first days of exposure are clearly evident in Figure 7; after about 25 days the differences diminish.

There is no evident reason, however, for a prolonged increase in fabric moisture when the pads are transferred from the humid to the dry atmosphere. For a brief period, continuing (but rapidly diminishing) diffusion of moisture from rubber to fabric may be expected. After 200 days at 100% relative humidity, however, the moisture in the rubber and that in the fabric may be supposed to be in practical equilibrium so that the pressure driving moisture from rubber to fabric is negligible. Hence, to arrive at an approximation to the actual distribution of moisture between rubber and fabric during the course of the drying period, it was assumed that the fabric moistures given by differences at the end of the high-humidity exposure were the ones actually prevailing. When the pads were placed in the dry atmosphere, the fabric moisture gradually started to decline; the rate increased with time. After a certain

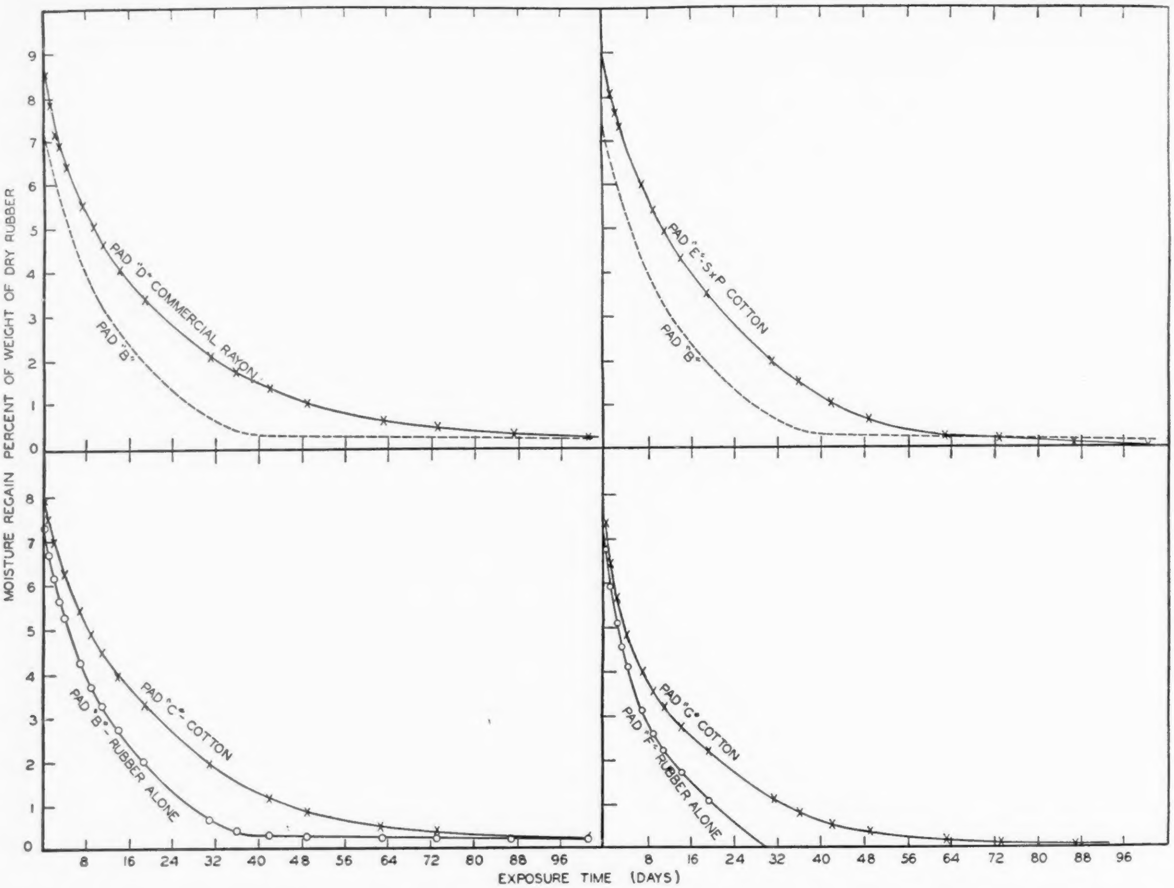


Fig. 7. Loss of Moisture by GR-S Carcass-Stock Pads Containing Cotton and Rayon Fabrics, Stored in Jars Containing $CaCl_2$, after Storage at 100% R.H.

number of days (varying from pad to pad) the excess moisture (in percent. of dry rubber weight) associated with the pads containing fabric was found to have dropped appreciably below its value at the start of the desiccation. From this point to the end of the experiment this excess was taken as the fabric moisture in each pad. More rigorous interpretation of this excess is that it is the upper limit on the fabric moisture. The moisture in the fabrics, as given by the above analysis of the data, is shown in Figure 3, along with that obtained previously for the storage of the pads at 100% relative humidity.

As would be expected, pad "E," in which the cord ends were exposed directly to the desiccating atmosphere, shows the most rapid loss of moisture, dropping to around 1% in about two months. The rayon cord in pad "D" shows the next most rapid decline in moisture. About 85 days are required for the moisture in the rayon fabric to drop to 2%. The cotton fabric in pad "G" requires about an equal period to attain the same percentage of moisture, though it contains only 4% moisture regain, as compared to nearly 16% in the rayon fabric at the start of the drying experiment. About 60 days are required for the moisture in the cotton of pad "C" to drop from 6 to 2%.

Conclusions on Moisture Desorption

It is readily apparent from Figure 3 that both cotton and rayon fabrics embedded in rubber desorb moisture more rapidly than they absorb it, under the extreme humidity conditions used in these experiments. Wakeham and co-workers[5] found similar behavior in the moisture of sealed-off tire sections. They, however, employed a higher temperature (185-200° F.), and accordingly found that the tire sections dried to equilibrium with 2% relative humidity in about 25 days. Considering that the present experiments were conducted at around 75° F., the two sets of observations are to be regarded as confirmatory.

The present results indicate also that while an embedded rayon fabric picks up a large amount of moisture, as compared to cotton, under arid conditions it loses this moisture much more rapidly than does cotton, even at equal moisture regain. The cotton fabric exhibits inertia with respect to moisture sorption, taking up moisture more slowly than the rayon, and then holding the moisture more tenaciously when it has been absorbed.

General Conclusions

Certain conclusions regarding probable moisture conditions in the fabrics of tires in actual service may be drawn from the present experiments.

(1) The results indicate clearly that the 2-4% moisture which cords are generally supposed to have at the time the tire is fabricated cannot be regarded as a permanent condition. The carcass rubber, very evidently, is not an impermeable envelope.

(2) In passenger-car tires in which the outer layer of

(*Continued on page 207*)

Statex K, a Furnace Carbon Superior To Channel Black

Reid L. Carr[1] and W. B. Wiegand[1]

THE low recovery of the impingement process has long been a challenge to the carbon black industry. The proportion of total carbon finally collected is less than 5%. Yet the product has been of such unique value, first in communication through the printed word, later in transportation through the pneumatic tire, as to require enormous expansion of production. Thus the eleven million pounds of channel black produced in 1905 rose to more than half a billion pounds in 1945. To produce this carbon there was consumed, in 1945, more than 350 billions of cubic feet of natural gas.

Furnace Processes Are Introduced

In the early 1920's two furnace processes reached commercial development. In the Thermatomic process natural gas was passed through furnaces containing heated refractory, being thus decomposed into carbon and hydrogen. In the Columbian Carbon (Matlock) process, developed about the same time (1922), large yellow flames of natural gas were burned in vertical furnaces. In both cases the product was collected in cotton bags.

By these furnace processes, the recovery was raised from less than 5% to upwards of 25%. The price paid was heavy. The new furnace blacks were far inferior to the standard impingement or channel black. They were useful in rubber compounding, but not in the all-important compounding of tire treads.

It was only natural that strenuous efforts should be made to remedy these defects. Millions of dollars were spent, and the efforts of eminent technicians applied, to the end of combining the efficiency of the furnace with the quality of the product plucked from the batwing flames of the channel process. The failure of all of these efforts, extending over two decades, may be ascribed to the continued adherence to a long-established doctrine.

The Doctrine of "Lazy" Flames

Vitruvius (30 B.C.), the Roman engineer, collected his lampblack made from burning pine resin by the gentle settling of the soot within highly polished marble walls.

"A vaulted apartment is built like a sweating chamber, and is covered carefully with a marble facing and smoothed down. In front of it a small furnace is built with outlets into the chamber, and the mouth of the furnace is carefully enclosed so that the flame does not escape. Resin is placed in the furnace. Now the fiery potency burns it and compels it to emit soot through the outlets into the chamber. The soot clings round the walls and vaulting of the chamber. It is then collected and in part compounded with gum and worked up for the use of writing ink; the rest is mixed with size and used by fresco-painters for colouring walls."[2]

The Chinese, practising their ancient art of stick ink manufacture, made impingement black from sesame or tung oil burning in wicks under inverted cones. Their standard textbook dating from the fourteenth century and translated by Jametel in 1882[3] contains the following (after further translation into English):

"On a day as calm as possible the evaporators, ten or more in number, are placed in a tight, well-lighted room, the walls of which are completely covered with hangings designed to prevent the flying of the black. The only door to the room must be small, opening from the inside outward and having a well elevated sill. During operations this door is covered by a paper curtain.

"The evaporators, having been disposed in a convenient manner, are filled with water and into each lamp is poured eight feunns of oil (ca. 24 grams). The lamps are then lighted. When the lamps are all lighted, all movement of the air in the chamber must be avoided. Without this precaution the soot would disperse and yield very little black."

The above instructions are just as valid and important today for obtaining maximum yields by the channel process as they were in the Fourteenth Century. A recent patent[4], granted on the baffling of air entering the channel houses in order to reduce turbulence and so to promote lazy steady flames, are reminiscent of our fourteenth-century Chinese author when he warns: (*v.s.*)

"The only door to the room must be small, opening from the inside outward and having a well elevated sill.

[1] Columbian Carbon Co., 41 E. 42nd St., New York, N. Y.
[2] "Vitruvius on Architecture", edited from the Harleian MS≠2767 and translated into English by F. Granger, Vol. II, pf. 121-123: Wm. Heinemann, Ltd., London: G. P. Putnam's Sons, New York (1934).
[3] "The Manufacture of Chinese Lampblack" from *"L'encre de Chine,"* translated by Maurice Jametel in 1882: published by Ernest Leroux, Paris, France.
[4] U. S. patent No. 2,399,969.

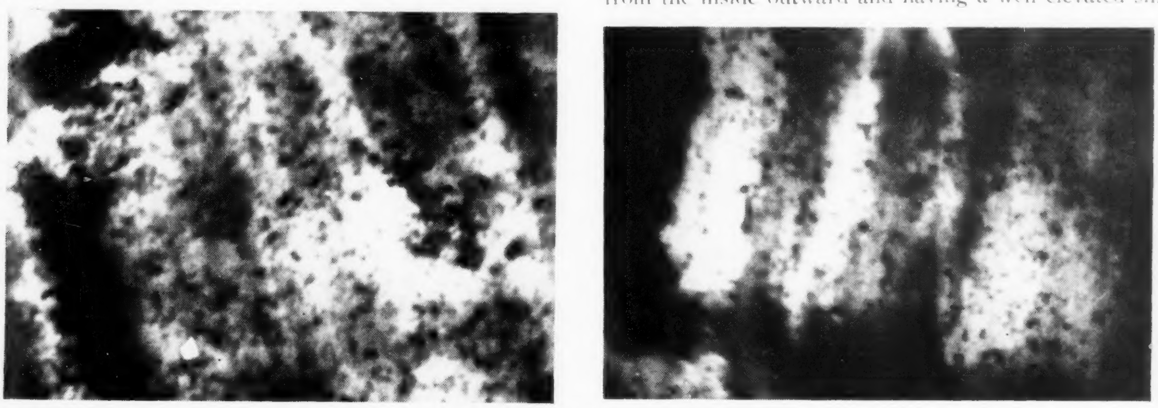


Fig. 1. Electron photomicrographs of Micronex W-6 (left) and Statex K (right) in nitrocellulose. High viscosity dispersion technique simulating milling action in rubber was employed. The greater persistence of chain structure of Statex K is apparent. (Magnification, app. 15,000 times)

. . . When the lamps are all lighted, all movement of the air in the chamber must be avoided."

Likewise in furnace processes, the emphasis has been upon streamline non-turbulent flow. Examples from the furnace patent literature ranging from 1924 to 1941 are given.[5]

Thus the "Lazy-Flame" doctrine dominated the carbon black industry for about two thousand years. Whether collected by impingement or as free soot in bags, the product was best as to quality or yield when released from flames burning gently and lazily within their envelopes of secondary air. If the flames were large, as in furnaces, the yield was high, but the quality low. If the flames were small (as in the batwing flame of the channel industry of today), the product rose in quality, but fell in yield. How, if ever, was this Gordian knot to be cut?

Statex K and the Infernal Regions

The Statex K process flies in the face of this long-established doctrine of lazy, streamlined non-turbulent flames. It begins with a roaring inferno of blast gases confined within furnace walls and so reaching white heat (upward of 2400° F.). Into this swirling, violently turbulent mass hydrocarbon or "make" gas is injected, also at high velocity. When these two streams meet, the make gas jets are shattered, heat transfer is quickly effected, and, as a result, Statex K particles are cracked out within a fraction of a second. Owing to the precise control of blast air, blast gas, make gas, temperature, velocity, and condition of furnace atmosphere, the particle size, reticulate chain structure, and nature of carbon surface are to a large degree predeterminable. The furnace products are finally cooled to around 450° F., agglomerated in a Cottrel precipitator, and collected in cyclones.

Economy in Natural Gas

Multiplication of pipelines to a point where they criss-cross the country has completely revolutionized the carbon black picture. What was once a plethora of natural gas has been changed to a paucity. The days when natural gas owners went a-begging to the carbon black producers are no more. Now the roles are reversed. The inevitable result must be a drastic rise in the cost, and so the price, of a pigment which in the past has played the unique double role of being at once the guarantor of rubber quality and the means of reducing cost! At 6¢ carbon black has half the volume cost of rubber. With the present trend of gas prices it would be only a short time until carbon black joined the ranks of most other rubber compounding chemicals with regard to cost.

Viewed against this background, the development of the Statex process and product may rightly be looked upon as a major contribution to the national economy. If, for example, the 1945 consumption of natural gas for channel black production had been replaced by that required for Statex K, the saving would have approximated 200 billions of cubic feet—or more than enough to keep the Big Inch pipeline at capacity day in and day out! The implications to the rubber industry are obvious. Statex K will tend to act as a powerful "buffer" against a drastic upward revision of carbon black prices. In this respect we believe the development of this new carbon black parallels the development of the American synthetic rubber industry which now acts as a brake on any very great increase in the price of natural rubber. In both cases long-range research, costing millions, has evolved synthetic substitutes for "natural" products and so emancipated the rubber industry from wild fluctuations in cost.

[5] U. S. patents Nos. 16,765 (reissue); 1,490,469; 1,658,676; 1,891,202; 1,902,753; 1,902,797; 1,904,469; 2,121,463; 2,144,971; 2,238,576; and British patent No. 461,497.

Economy in Steel

In this, the Age of Steel, it is perhaps also worthy of note that in the new Statex K process a single furnace occupying 400 square feet equals, in output, 35 channel houses spread over 42,000 square feet, and containing 46,000 luminous "batwing" flames! This entails a saving of more than 50% in the amount of steel required.

A Note on Costs

At the moment these economies in natural gas and in steel are not reflected in lowered costs of manufacture. The reasons are that the initial costs of a Statex plant are higher and so also the labor and supervisory expenses. At the present time the extensive controls, instrumentation of all kinds, highly specialized engineering plus a staff of trained chemists and engineers combine to raise costs over those of existing channel plants. But this condition cannot last, and it appears to us inevitable that the cost lines will soon cross, and thereafter steadily diverge, and in favor of Statex K.

What Is Statex K?

The ultimate test for reinforcement by a rubber carbon is road wear. By this test Statex K has been reported as showing road wear in natural rubber tire treads which is the equivalent of channel black. In GR-S tire treads, the ratings for Statex K have been up to 115% of channel black. In addition Statex K has given, on the road, better flex life and, in the factory, markedly better processing. Finally Statex K treads are "non-static" owing to their electrical conductance.

The laboratory properties of Statex K are broadly reviewed in Table 1.

TABLE 1. PROPERTIES OF STATEX K

Chemical and Colloidal Properties	Statex K	Channel (EPC)
Surface area, acres/lb	9	10.5
Purity (fixed carbon)	99%	95%
pH	9	4.5
Structure index	120%	100%
Tinting strength	95%	100%
Tone (relative)	Blue	Brown
Adsorption DPG	5	10
Iodine (x10⁶)	7	6
Benzoic acid	1.8	0.8
Electrical resistivity (dry, ohm/cm)	0.5	38
GR-S Tread Properties	**Statex K**	**Channel (EPC)**
Carbon loading	50%	45%
Tensile strength, p.s.i.	3200	3250
Modulus (L-300), p.s.i.	1100	700
Shore hardness (5") (A)	57	56
Log R (elec. resistivity)	3.3	7.8
Garvey die rating	12	10
Hot tensile (@ 212° F.), p.s.i.	1200	800
Aged tensile, p.s.i. (24 hrs. @ 212° F.)	2800	2100
Laboratory abrasion rating	135	100
Laboratory flex rating	155	100
Natural Rubber Tread Properties	**Statex K**	**Channel (EPC)**
Carbon loading	50%	50%
Tensile strength	4250	4300
Modulus (L-300)	1280	1020
Shore hardness (A)	61	62
Log R (elec. resistivity)	3.2	6.5
Rebound	72%	63%

Comments on Table 1

How do these data support or explain the actual road performance results with Statex K which have already been mentioned? To those who rate tensile strength as the most significant single property of a tread compound the green tensiles of Statex K will be unimpressive. However when tested hot (in GR-S) Statex K is seen to surpass channel by a comfortable margin. To those who rate modulus as important, Statex K stocks will appeal since in both polymers, L-300 exceeds that of channel by significant margins. The superior aging and flexing

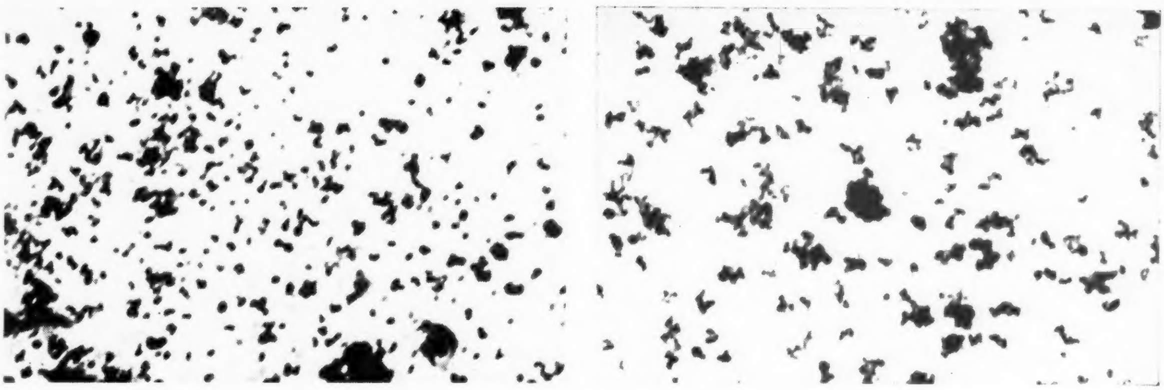


Fig. 2. Electron photomicrographs of Micronex W-6 (left) and Statex K (right) in vulcanized rubber. Sections about one millionth of an inch in thickness cut by Columbian super-microtome. (Magnification, 15,000 times)

properties of Statex K over channel have been corroborated in finished tires.

As regards surface area and development of reticulate chain structure (structure index) it may be said that Statex K represents a highly advantageous balance. By this statement is meant that the surface area of Statex K involves a marked advantage over channel in resilience and yet with no sensible penalty in strength. Likewise its structure development involves a marked advantage over channel in processing and yet with no significant penalty in elongation. The several thousand times greater electrical conductance of Statex K stocks compared with channel stocks offers the solution to tire "static" problems.

In ancient times the flames of burning natural gas had their priestly acolytes. During the past 70 years we have depended upon "Those Slaves of Fire, who morn and even" tended the ten million flames which have yielded the precious channel black of today. Soon towering tanks and cyclones, gaunt stacks, vermiform flumes, and mighty incandescent furnaces will be tended by shining dials, gages, and regulators! The acolytes will be highly trained chemists and engineers. We express the hope that they may still continue to be awed by the age-old Mystery of Fire.

Moisture Transfer

(Continued from page 204)

rubber in the sidewalls is on the order of 1/16-inch thick, the moisture in the outer plies of a cotton fabric may be expected to amount to 6.0 or 7% when the tires have been in service for six months in a damp climate (say 70 to 75% relative humidity).

(3) It appears that under the conditions of *thorough, deep* embedment in rubber, cotton cords at normal temperatures, absorb moisture very slowly above about 6% regain, even when the rubber envelope is exposed to 100% relative humidity. These conditions are fulfilled by the cords in most of the plies of heavy-duty bus and truck tires.

(4) If breaks occur in the outer rubber, and the tires are generally used on wet pavement or poorly drained roads, the moisture regain may be expected to rise to 12 or 14%, as our results on pad "E" suggest.

(5) Under the same conditions outlined in the above conclusions, the moisture in *rayon* fabrics could be expected to be from 20 to 100% greater than the moisture in *cotton* fabrics.

(6) In normally dry climates (where the average humidity is in the range of, say, 20 to 45%) it would appear that the original moisture in the fabrics of undamaged tires would remain substantially unchanged for an indefinite period.

(7) Through a cycle of exposures to humid and arid atmospheres, the time-average moisture regain of rayon fabric would appear to be about three times that of a similarly encased cotton fabric.

The foregoing conclusions receive added weight from the fact that they are in agreement with the results of the Wakeham[5] group. The two series of experiments are complementary in that Wakeham used actual tire sections, which, however, necessitated complicated experimental procedures; while in the present study the geometry of the test pieces had little resemblence to that of a tire, but was sufficiently simple that direct methods could be employed to follow the complete moisture history from curing onward.

The authors wish to acknowledge the helpful advice of Carl M. Conrad at the outset of this investigation and his continued interest through the preparation of this report.

World Economic Trends

(Continued from page 198)

point where the manufacture of synthetic rubber in this country would be more nearly competitive.

Private Enterprise and the Future of Synthetic Rubber

It is unlikely that the new higher world demand and supply position for rubber will reach an equilibrium before April 1, 1948, at which time the present stop-gap legislation on rubber must be replaced by a long-term policy; but if a new high in rubber consumption is realized, it will probably occur in 1949 or 1950.

It is, therefore, not difficult to visualize that at some time about two or three years from now, with the production of synthetic rubber by competitive private enterprise and with the results of competitive research efforts, progress of inestimable value to the future of the overall American economy can be achieved.

Correlation of Laboratory and Service Abrasion Tests[1]

A. E. Juve[2], F. L. Graves[3], and J. H. Fielding[4]

LABORATORY abrasion tests are run for control, development, and research purposes in most rubber laboratories. The question, "How well do the results of a particular abrasion test correlate with performance in a particular service application?" is constantly being asked. It was the assignment of the authors of this report to obtain data and opinions on this question from representative rubber technologists.

Procedure and Results

A questionnaire was submitted to a number of laboratories which the authors felt were most representative of the laboratories interested in abrasion testing and which would be most likely to have data on the correlation of laboratory and field tests. The questions asked were the following:

(1) What type of laboratory abrasion tests do you use?

(2) What type-stocks are tested on the various machines used?

(3) What degree of correlation do you find between laboratory and field tests?

(4) Do you follow the methods described in A.T.S.M. D-394-40, and if not in what respects do your methods deviate?

A.S.T.M. D-394-40 at the present writing includes three methods for determining abrasion resistance. These are the du Pont or Williams method, the Bureau of Standards method, and the United States Rubber Co. method.

Other machines mentioned in answers to the questionnaire included the Goodyear angle abrader described by Vogt,[5] the Lambourn (British Dunlop) machine described by Lambourn,[6] and the Goodrich machine not yet described in any publication. In the latter method the sample, in the form of a sheet approximately 0.1-inch thick, is cemented to the periphery of a small-diameter pneumatic tire inflated to a fixed air pressure. The wheel on which the tire is mounted is driven against a drum on which the abrasive is mounted. The drum is also driven, but at a fixed differential in surface speed to that of the tire. A controlled stream of dust is allowed to drop on the abrasive for the purpose of preventing its gumming. This method incorporates two features which are departures from the methods previously used. These are the pneumatic cushion and the use of dust to prevent gumming of the abrasive.

The results obtained are given in the attached tables and graphs. In addition to data obtained in answer to the questionnaire additional published data are shown in Figures 6, 7, and 8.

TABLE 1. TIRES

Laboratory No.	Methods Used	Degree of Correlation with Road	A.S.T.M. Methods Followed?
1	Du Pont	Unsatisfactory (See Fig. 1)	Essentially
2	Du Pont	Fair after aging test buttons (See Fig. 2)	Essentially
2	Goodrich	Fairly good for natural rubber (See Fig. 3)	—
3	Goodyear angle (modified)	Fair with limitations* (See Fig. 4)	—
4	Goodyear angle (modified)	Fair with limitation†	—
5	None		—
6	Goodyear angle	Not reported	—
6	Du Pont	Fair to poor (See Fig. 5)	Essentially
6	U. S. Rubber	Not reported	Essentially
6	Lambourn	Fair with results in about the same order as given by the du Pont machine	—
7	Goodyear angle	Good with limitations‡	—
8	U. S. Rubber	Good to poor§	Some deviation

*For comparison of different carbon blacks the correlation is very good Laboratory tests tend to magnify differences found in service tests. Factory mixed and tubed stocks should be used rather than laboratory mixed stocks for best results. Softener variations including fatty acid cannot be successfully compared. Pigment loading variations must be kept within a narrow range. Compounds of widely different compositions cannot be compared.

†Correlation is good if the following precautions are observed: (1) A minimum of eight wheels should be tested per compound. (2) Tests should be run both before and after oven aging, particularly when GR-S is being tested. (3) An equilibrium running temperature should be attained before a test is started. (4) A standard should be run with each group of experimental wheels. (5) The test wheels should be systematically alternated on the different machine mounts. (6) A minimum of 3 to 4 cc's should be abraded from the sample.

‡Carbon black variations give good correlation between laboratory and road tests. Fatty acid variations do not. This test is less sensitive to modulus or hardness variations than other methods.

§High fatty acid content introduces an appreciable error. Correlation for GR-S compounds poorer than for natural rubber.

TABLE 2. HEELS AND SOLES

Laboratory No.	Laboratory Method Used	Degree of Correlation	A.S.T.M. Method Followed?
1	Bureau of Standards	Fairly Good	Yes
2	Bureau of Standards	Fair	Essentially
3	Du Pont	Doubtful*	Essentially—2½ garnet paper used
4	Bureau of Standards	Fair†	Yes
5	Bureau of Standards	Fair with limitations‡	Yes
6	Bureau of Standards	Fair with limitations§	Essentially

*For best correlation the compounds tested must be in the same hardness range, have approximately the same state of cure, and contain the same amount and type of softeners.

†Correlation is not very accurate. It is better for natural rubber than for GR-S.

‡When minor compounding variations are tested, the correlation is fair. When widely different types of compounds are tested, it is poor.

§Fair for materials of similar composition only. Plastics or high resin stocks give false results.

TABLE 3. MISCELLANEOUS PRODUCTS

Laboratory No.	Laboratory Method Used	Products	Degree of Correlation	A.S.T.M. Method Followed?
1	Du Pont	No specific product	No data	Essentially
2	Du Pont	Belt covers; chute linings	No data	Essentially
2	Wyzenbeek	Elastic plastics	Thought to be fair	—
3	Du Pont	Hose and belt covers; chute and tank linings*	Doubtful	Yes
4	Du Pont	No specific product	No data	Essentially

*Satisfactory for distinguishing good from poor compounds and for control purposes. It does not distinguish small differences. Because of the wide variety of conditions to which these products are subjected in service, precise correlation would not be expected.

The conclusions reached after consideration of the answers to the questionnaire are as follows:

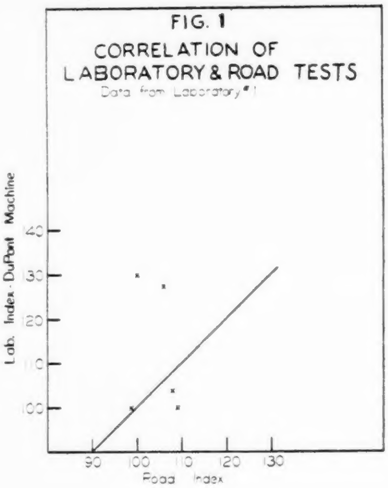
(1) Reliable data were available only with respect to tire treads. Data and opinions on other products were few and conflicting.

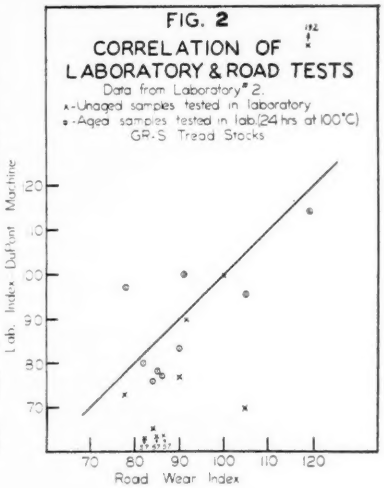
(2) There was general agreement that the correlation between laboratory tests and tire tread performance was fair for most of the machines in use, but that the correlation was satisfactory in each case for only a limited range of compounding variations.

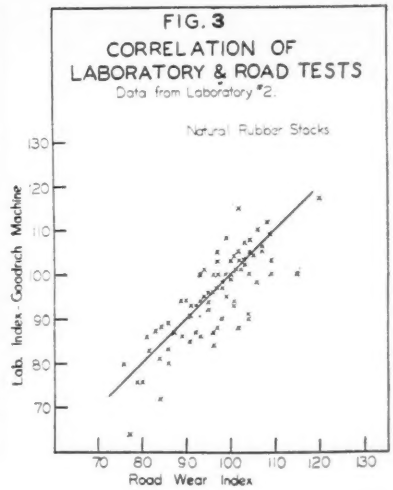
(a) Correlation is not good if the compounding variations include fatty acid or softener variations.

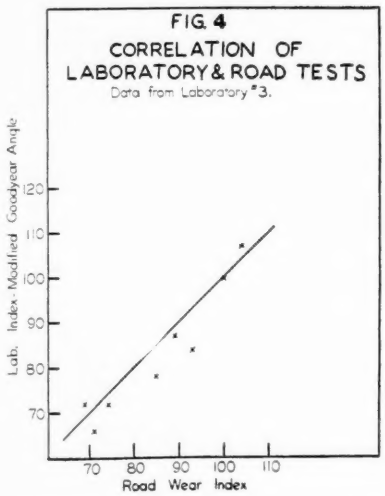
(b) It is not good when comparing various base polymers. Several reports indicated that the correlation was less satisfactory for GR-S than for natural rubber.

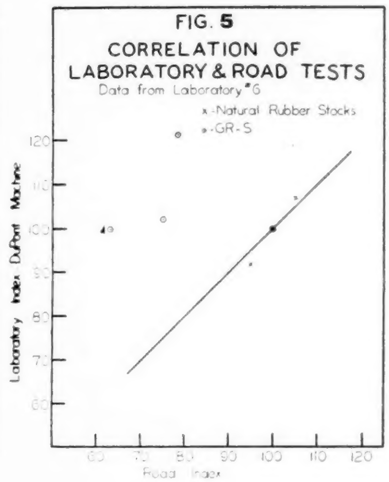
[1] A review prepared for Sub-Committee XIV of D-11 of A.S.T.M. Presented at A.S.T.M. Spring Meeting, Philadelphia, Pa., Feb. 26-27, 1947.
[2] B. F. Goodrich Co., Akron, O.
[3] American Cyanamid Co., Stamford, Conn.
[4] Goodyear Tire & Rubber Co., Akron, O.
[5] *Ind. Eng. Chem.*, 20, 302 (1928).
[6] *Trans. Inst. Rubber Ind.*, 4, 210 (1928-29).

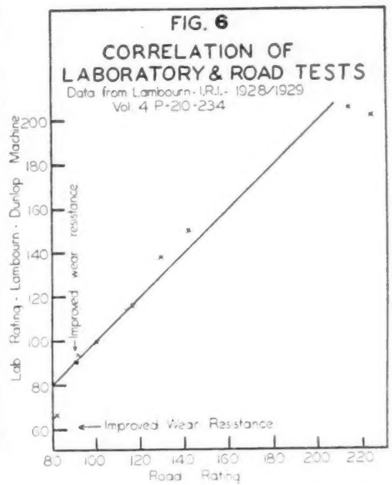


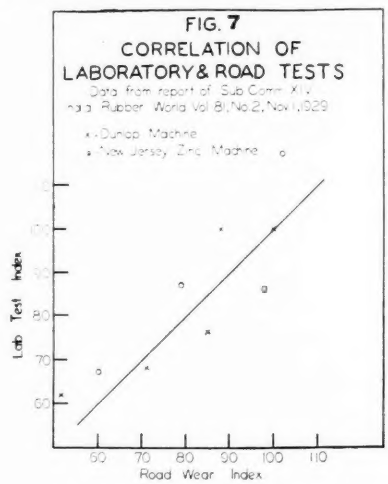


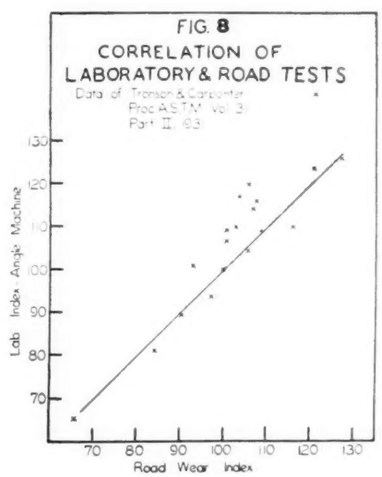












(c) It is not good when comparing radically different compounding techniques.

(d) It is generally good when comparing various grades of carbon blacks.

(3) The du Pont machine is the most popular of those used for tire tread work. The Goodyear angle abrader is the next most popular. In the footwear industry the Bureau of Standards abrader is most widely used.

The reasons for failure of correlation are important since they would indicate in what respects present laboratory test methods are inadequate. The following possible reasons for disagreement on tire treads have been deduced from the comments received from various lab-

oratories and from the personal experience of the authors:

(1) Different road tests will not necessarily rate two different compounds in the same order. This may occur if the two tests were run under different conditions, as for example, if the tire designs were different, if the average temperature during the road tests were different, or if the abrasive character of the road surfaces were different. Thus if road tests do not invariably rate a series of compounds in the same order a precise correlation between laboratory tests and *all* road performance tests is not possible.

(2) The state of cure is usually not the same in the laboratory test specimen and in the tire tread. If there were a constant difference this would not be so objectionable, but the probabilities are that it is variable.

(3) If the laboratory test specimens are made from stock mixed on a laboratory mill, the degree of pigment dispersion and the amount of breakdown of the rubber are likely to be appreciably different from the factory mixed stock used on the tire.

(4) The rate of wear changes in the course of a tire test owing to the stiffening or softening resulting from continued cure or aging. This factor may at times be responsible for reversing the relative position of two stocks. This does not occur in laboratory tests at least to the extent that it does in service.

(5) Laboratory tests are usually made to proceed too fast. The nature of the abraded surface and the particles removed indicate a somewhat different process than occurs on the road.

(6) The temperature coefficient of abrasive wear is quite high and is different for different stocks and different polymers. Laboratory tests may and probably do rate the various stocks at a different temperature level from road tests.

(7) The abrasion of a tire tread is intermittent: a particular point on the tread contacts the road only once in each revolution. Many of the laboratory tests are continuous.

(8) Laboratory tests tend to overemphasize the effect of high modulus. This is probably associated with the difference in cushioning of the sample, i.e. a. pneumatic cushion in the tire and only the deflection of a relatively thin block of rubber in the laboratory test. (The Goodyear angle abrader is somewhat better in this respect than the du Pont machine, and the Goodrich method eliminates it by the use of a pneumatic cushion).

(9) Laboratory tests are frequently erratic owing to the abrasive being filled up or rendered gummy by the character of the stock being tested. This does not occur in the road primarily for the reason that the abrasive track is being constantly renewed.

Many of these points were brought out in the discussion following the symposium on abrasion testing of rubber.[7] Specifically the difficulty of duplicating road ratings from time to time, the temperature effect, the exaggeration of the modulus in most laboratory tests, and the problem of gumming of the abrasive track were discussed.

One of the most consistent objections to results from laboratory tests is that of gumming the abrasive. Because of this constantly recurring complaint it would be desirable if some attention could be given to eliminating this difficulty either by the method of dusting or by using a continuously renewed track. Other methods such as the suggestion that the samples be extracted prior to testing might be considered.

[7] "Proceedings of the American Society for Testing Materials," Vol. 31, Part II, p. 895, A.S.T.M., Philadelphia (1931).

There appears to be no immediate necessity for revising the methods as they now appear in A.S.T.M. D-394-40. This is based on the results of the questionnaire which showed that the present methods are followed with but minor deviations.

Because of the popularity and generally good experience with the Goodyear angle abrader, some consideration should be given to including it in A.S.T.M. D-394-40.

Summary

There appears to have been no substantial improvement in the degree of correlation between laboratory abrasion and service tests of tires since the time of the A.S.T.M. symposium on abrasion testing in 1931. The limitations with respect to compounding variations are essentially the same today as then.

The data on products other than tires are too few to permit any conclusion to be drawn.

The reasons for the failure of laboratory tests to correlate with road results are many and varied. Some of these are listed in this report. They represent not only weaknesses in the laboratory procedures, but also difficulties in standardizing service tests.

A better laboratory test method should incorporate the following features:

(1) Cushion the sample to minimize the modulus effect.

(2) Provide means to prevent gumming of the abrasive.

(3) Provide means to conduct the test over a range of temperature.

(4) Slow the rate of wear, partly by abrading intermittently and partly by use of less load and duller abrasive.

(5) The test sample should be of a size which can be cut from a tire tread if desirable.

Rubber Trade in Argentina

The lack of rubber during the war years provided a considerable set-back for Argentina's hitherto rapidly expanding rubber industry. Up to that time the local industry, protected by import duties and internal revenue taxes on imports, had been able to produce an exportable surplus of various rubber articles, chief among which were tires. Argentina began the manufacture of tires in 1931, and from then on until the rubber shortage caused by the events following the outbreak of the war in the Pacific crippled the industry, progress was continuous. Then in order to insure the provision of at least a part of the much-needed tires, the protective duties imposed on foreign tires were removed and have not yet been reimposed as local output is not yet capable of supplying the accumulated demand.

Since the war's end, however, production is once more on the increase; for November, 1946, it was estimated at 60,000 casings, and it is expected to be about 70,000 per month by the middle of the current year. Since the annual demand for the next two or three years has been put at 850,000 tires and tubes, Argentina should be able to dispense with most tire imports in a year or so.

Meanwhile she has made a trade agreement with Brazil whereby the latter is to supply 40,000 truck and bus and 40,000 passenger-car tires and tubes in 1947, and a certain quantity of tires and tubes to supplement domestic production through the period of 1948-1951.

Argentina has further made an arrangement with Bolivia to insure supplies of crude rubber for the future. The Argentina Trade Production Institute has undertaken to make available to her neighbor 3¾% 50-year loan of 100,000,000 pesos to increase commerce between the two countries and to stimulate the production in Bolivia of rubber, iron, and coal. Bolivia undertakes to devote 500,000 hectares to rubber production, and Argentina on her part agrees, among the rest, to buy 2,000 tons of Bolivian rubber annually for two years.

EDITORIALS

World Economic Trends and the Future of Synthetic Rubber

AN ARTICLE on this subject of "World Economic Trends and the Future of Synthetic Rubber," by William F. Zimmerli, is a feature of the article section of this issue of India RUBBER WORLD and should be helpful in providing a further basis for additional thought in connection with the difficult problem of deciding the future of synthetic rubber in this country. The idea that there will be a continuing industrial expansion in the world as a whole and in this country in particular during the next several years receives confirmation from government economists and some private economists and economic research organizations. The Twentieth Century Fund, a privately endowed research foundation, has just made public a comprehensive work entitled, "America's Needs and Resources," which explains what economic life in this country might be like in the 1950-60 period if we are able to maintain employment and production at a high level.

That overall industrial expansion on a world basis would result in a new high in the demand-supply situation for both natural and synthetic rubber is a foregone conclusion. As Mr. Zimmerli points out, if only a few of the European, Asiatic, and South and Central American countries, whose per capita consumption of rubber in the 1930's was very low, achieve a consumption in the next several years about half that of the United States in 1937, the production of synthetic rubber in this country by private industry might become a very worthwhile operation.

John L. Collyer, president of The B. F. Goodrich Co., in a recent statement has also emphasized that beyond provisions for the production of a national security minimum of general-purpose synthetic rubber, the principle of competitive enterprise should prevail, because the free play of economic forces will do more than anything else to spur research and development of all types of rubber, to broaden their usefulness, and to make more and better products available to more people.

Harvey S. Firestone, Jr., president of the Firestone Tire & Rubber Co., in his statement at the beginning of 1947, included the observation that all the elements essential to continued prosperity are here, and if we have the wisdom and skill to make the best use of them, the potential demand will be tremendous. People will want and need the products of high-level employment. They have reawakened to the realization that we, in the United States, have the world's highest standard of living, not by mere chance, but because we have built upon the foundation of free enterprise. If free enterprise is to survive, industry must succeed, and a large measure of its success will depend on its ability to distribute the products of the factory, the forest, and the farm economically, efficiently, and intelligently so that more people may enjoy more of the good things of life.

W. S. Lockwood, foreign trade consultant, in his monthly Rubber Report dated April 15, discusses the "Long-Range Rubber Problem". In connection with the present national policy on synthetic rubber and with special reference to the continuation of specification control for rubber products, he opposes "compounding by legislation" and states that we must not forget that the synthetic rubber industry's need is not of the *status quo* maintenance of an admittedly inferior product, but *the technical development of constantly better products at constantly lower cost.* What is really needed is *incentive for research*—not forced production or forced consumption of existing products. We must not encourage Communist dominated governments in areas important to our natural rubber supply by long continued, *artificially* high, forced consumption of synthetic rubber, with resulting *artificially* low prices for natural rubber complicating the serious surplus overhanging the market in late 1948 and 1949.

It is argued that we should look *now* with great care at the commodity proposals of the International Trade Organization, a meeting of which is now taking place in Geneva, Switzerland, as a most important attempt at building a larger international trade. One of the proposals of the I. T. O. is the use of inter-governmental commodity arrangements to prevent or alleviate the serious economic problems which may arise when production adjustments cannot be effected by the free play of market forces as rapidly as circumstances require.

Basically, it is believed that essentially the same point of view is held in all of these cases, that is, continuing worldwide industrial expansion and a greater volume of international trade hold the promise for an era of peace and prosperity greater than the world has ever known. However one of the causes of economic depressions which often lead to war is the plight of millions of producers of primary commodities caught in preventable market collapses. Whether this difficulty will be removed by the free play of economic forces in a world moving continuously toward a higher standard of living for all its inhabitants or whether it will require inter-governmental commodity agreements because the supply of materials such as rubber exceeds the demand, will be determined by time and the course of world events.

It is hoped that the necessity of inter-governmental commodity agreements can be avoided since such agreements are by their nature restrictive rather than enlarging in their affect on the world's industrial activities and trade. In any event, if a world shortage instead of a surplus of rubber develops two or three years from now, government and industry in this country should make plans to take advantage of the situation. Participation by private industry in future large-scale production of synthetic rubber will require, first of all, an improvement in the environment under which competitive research may be conducted, before any real progress can be made here.

Scientific and Technical Activities

A. C. S., Division of Rubber Chemistry, Cleveland Meeting

THE Division of Rubber Chemistry of the American Chemical Society will meet in Cleveland, O., on May 26, 27, and 28, with headquarters at the Hotel Cleveland. This Division meeting is separate from the spring meeting of the parent Society, which was held in Atlantic City, N. J., during the week of April 14.

Information with regard to meeting details have appeared previously in India Rubber World, on page 674 of the February issue and on page 79 of the April issue. Briefly, this previous information reported that local arrangements for the meeting were being handled by a committee headed by Allyn I. Brandt, with C. A. Smith as vice chairman in charge of housing arrangements. The procedure for making hotel reservations is to address a letter to the Hotel Cleveland, Public Sq. and Superior Ave. After the allotted number of rooms is used up, reservations will be distributed by the Cleveland Convention Bureau among the Statler, Hollenden, and Carter hotels. It is important that if a special hotel is preferred, this choice should be indicated in writing for reservations. No postcard for making hotel reservations will be provided Division members this year.

The banquet of the Division will be held at the Hotel Carter on the evening of May 27 and will be preceded by a cocktail hour, sponsored jointly by suppliers to the industry. Tickets for the banquet may be obtained from C. J. Harwick, Harwick-Standard Chemical Co., 609 Akron Savings & Loan Bldg., Akron 8, O. Tickets will also be available at the registration desk in the Hotel Cleveland, but because of the limited facilities for this banquet and the expectation of the usual large demand for reservations, it is suggested that these tickets be obtained as soon as possible. The price will be $5 each.

The morning of May 26 has been set aside for registration, and the technical sessions at the Hotel Cleveland will begin at 1:45 p.m. on that day with opening remarks by W. W. Vogt, Goodyear Tire & Rubber Co., chairman of the Division. The first paper will be presented at 2:00 p.m. on May 26, and the technical sessions will continue on May 27, beginning at 9:00 a.m. and 2:00 p.m., and will be concluded with a morning session on May 28, beginning at 9:00 a.m. The business meeting is scheduled for 4:25 p.m. on May 26.

The papers to be given at the technical sessions have been scheduled so as to group together papers on the same or related subjects as far as possible. The papers on Monday afternoon, May 26, will be concerned mostly with compounding and processing; those on Tuesday morning and afternoon, May 27, with carbon black, rubber chemistry, and high polymers; those on Wednesday morning, May 28, with testing and reclaiming processes.

Because of the large number of papers scheduled, the time allowed for presentation has been reduced somewhat below that requested by the authors. The officers of the Division have asked the authors to condense their papers sufficiently so that they may be adequately presented in the time allowed. When published, the papers will, of course, be presented in full.

Abstracts of the papers are given below, except for three papers which are repeated from the High Polymer Forum, sponsored by the Division of Rubber Chemistry at the recent Atlantic City meeting of the Society. Only the titles and authors of these three papers are included since abstracts appeared on pages 73 and 74 of our April issue.

Rubber Division Abstracts

Monday Afternoon — May 26

Effect of Low Molecular Weight Polyisobutenes on Natural Rubber, GR-S and Blends Thereof. The low molecular weight polyisobutenes (L.M.P.B.), of which Vistac No. 1, Vistac No. 2, and Vistac No. 4 are typical examples, are extremely viscous liquid hydrocarbon polymers with estimated molecular weights of 1100, 1500, and 3000, respectively. By virtue of their nature and preliminary indications, the investigations were made, treating the L.M.P.B. as plasticizing agents.

The fullest advantage of any plasticizer is realized only if added to the rubber at the earliest possible stage in the mixing operation. Adding the plasticizer first followed by fillers and other ingredients was chosen as standard procedure in these tests.

Results indicate the L.M.P.B. exercise plasticizing action and shorten milling time by rapid incorporation and dispersion of fillers and other ingredients.

Vistac No. 1, Vistac No. 2, and Vistac No. 4, being chemically inert, have no effect on the curing rate and produce firm stocks with good processing qualities and aging characteristics.

A study of L.M.P.B. in typical GR-S stocks indicates a maximum tensile strength, modulus, and recovery up to 15 parts on 100 parts GR-S. Above 15 parts the tensiles and modulus drop sharply producing very tacky vulcanizates attributable to the exudation of the L.M.P.B. Additions above 35 parts isolate curing ingredients from the rubber, thus producing a soft uncured vulcanizate.

On the other hand the L.M.P.B. can be added in liberal dosages in natural rubber without exudation. Results of natural rubber vulcanizates plasticized with L.M.P.B. indicate excellent stress-strain properties, resistance to flexing, low permanent set, and increased resiliency. Increases in the amount of L.M.P.B. are accompanied by a linear reduction in physical properties as contrasted to the sharp decline in GR-S.

Vistac No. 1, Vistac No. 2, and Vistac No. 4 are odorless, non-toxic and do not discolor white or light-colored stocks.

Data are given to illustrate the effect of L.M.P.B. on the plasticity of uncured stocks of GR-S, natural rubber, and blends, as well as the effects on the cured physical properties of typical compounds, in comparison with the following types of plasticizers: coal-tar distillates, asphaltic flux products, and unsaturated hydrocarbons. Method of handling L.M.P.B. as well as illustrations of compounding incorporating times will be presented. H. P. Pryor, Advance Solvents & Chemical Corp., New York, N. Y.

"Pliolite S6 in Rubber Compounding." Pliolite S6 is a hydrocarbon copolymer resin, developed by Goodyear, which has been used as an effective reinforcing agent for rubbers without the presence of black. Not only is the addition of Pliolite S6 effective in improving the physical properties of the polymer, but it is a definite aid in improving the processing characteristics and aging properties of the stock.

The reinforcing action of Pliolite S6 is most effective in GR-S and nitrile type polymers. Incorporation of up to 50 parts of resin to 100 parts of polymer hydrocarbon increases tensile strength, increases elongation, and modulus, improves tear resistance and flex resistance, and increases hardness without materially increasing the gravity of the stock. Pliolite S6 makes possible the production of quality light-colored stocks of low specific gravity from these polymers.

The incorporation of Pliolite S6 into natural rubber and neoprene increases the modulus and hardness of the stocks, but does not increase the already high tensile strength of the stock. One important advantage for the incorporation of Pliolite S6 into natural rubber stocks lies in the pronounced improvement in aging produced by as little as 10 parts of resin.

Results to date have indicated no advantage to the use of Pliolite S6 in Butyl.

Pliolite S6 also exhibits its reinforcing action in conjunction with black and can be used to secure additional reinforcement without obtaining the high specific gravity characteristic of high loaded black stocks. R. J. McCutcheon and H. S. Sell, Goodyear Tire & Rubber Co., Akron, O.

Processing Behavior of High Polymers—Effect of Plasticizer Type. The purpose of this paper is to apply a new concept of plasticization to the processing improvement of synthetic high polymers. On the basis of vulcanizate swell, plasticizers are classified, for a given elastomer, as "solvent" or "non-solvent." Microphotographs add visual support to such a classification.

The processing behavior of polymer-plasticizer systems prepared from Butyl, Perbunan, GR-S, and neoprene rubbers is considered. Experimental results are made to correlate with actual processing operations.

The elastic-plastic characteristics of the polymer are not altered favorably by inclusion of the "solvent" plasticizer. Hence no processing improvements result. With the "non-solvent" plasticizer, drastic reductions in the apparent elasticity of the polymer systems are realized so that exceptionally smooth processing stocks are obtained. Coupled with these data, the rate of extrusion of the "non-solvent" polymer-plasticizer system is shown to increase rapidly with the concentration of the plasticizer, while that of the "solvent" polymer-plasticizer system remains substantially unchanged.

Since the "non-solvent" plasticizer is in the strict sense incompatible with the polymer, limitations in its use are developed based on the viscosity of the former to prevent its exuding from the stock and to allow for a close enough association with the polymer that the cohesive strength of the mass will not be destroyed.

Some theoretical considerations are advanced to explain the physical mechanism involved in the characteristic behavior of each of the two types of polymer-plasticizer systems. A. M. Gessler and A. F. Savko, Esso Laboratories, Standard Oil Development Co., Elizabeth, N. J.

Softeners for GR-S Tires. I. An Evaluation of Nine Softeners in GR-S Tire Treads. A selected group of softeners, containing examples of all of the types com-

monly used in tire compounding, was evaluated in GR-S tread stocks in road tests under a variety of conditions, supplemented by laboratory evaluations. Small but measurable differences in road wear were observed between the various types of softeners. Comparison of these differences with those found in the laboratory evaluation supports the view that laboratory tests cannot be used as a basis for precise predictions of road performance, but are useful in screening out unsatisfactory materials. V. V. Wheeler and R. Vance, General Tire & Rubber Co., Akron, and F. M. McMillan and B. O. Blackburn, Shell Development Co., Emeryville, Calif.

II. Evaluation of Combinations of Carbon Black and Plasticizer as Extending Agents for GR-S Tire Treads. (1) In laboratory compounding studies it was found that an extender-type plasticizer could be used in combination with a carefully predetermined amount of carbon black to increase the total loading of GR-S tread stocks quite substantially while maintaining most of the physical properies of the vulcanizate practically constant and holding all of the important properties within satisfactory limits. Certain properties, particularly those of the aged vulcanizates, were best for the more highly extended compounds, and increasing advantages in processing characteristics as well as cost were noted. (2) An extensive series of road tests was carried out to evaluate the compounds developed in the laboratory in actual road service in both passenger and truck tires under a wide variety of climatic conditions, road surfaces, and driving habits. In these tests the extended compounds performed quite satisfactorily; even the most highly loaded stock tested proved equal in road wear to the conventional GR-S tread stock used as a control. F. M. McMillan, V .V. Wheeler, and B. O. Blackburn.

Isoprene-Styrene in the GR-S System. A series of isoprene-styrene copolymers varying in monomer ratio from 100/0 to 60/40 has been prepared in the GR-S recipe. Physical tests in a tread recipe show superiority for these polymers over GR-S in running temperature, blowout time, and ball rebound at 212°F., with very little change being caused by monomer ratio. The tensile strength and cut growth resistance improved with increased styrene content; while the room temperature rebound and cold resistance fell off.

A number of activated recipes has been applied to the 75/25 isoprene-styrene ratio at 50° C. with the following maximum conversion rates being obtained.

Activation	Time, Hrs.	Conv. %
Isoprene GR-S (control)	16.0	71
$K_3Fe(CN)_6$	16.0	84
Acrylonitrile (2 pts.)	15.3	82
Redox (soap flakes)	1.5	68
MDN*	4.0	77

*p-methoxyphenyl diazothio-β-napththylether.

The use of ferricyanide or acrylonitrile activation offers the most immediate possibilities for plant usage because of the small deviation from GR-S conditions. Only small variations in physical properties were noted for the polymers from the various activated systems. Little difference in physical properties was noted for polyisoprenes prepared in a Redox system at temperatures ranging from 40 to 10° C.

Isoprene - styrene (75/25) copolymers with varying gel characteristics were prepared in a GR-S system. As the gel varied from low to high temporary to high permanent, the following effects on physical properties were noted: reduced running temperature, increased blowout time, decreased cut growth resistance, and little effect on tensile, elongation, or rebound.

Tests on polymers prepared in the pilot-plants have substantiated results obtained on polymers prepared in the laboratory. J. M. Willis, L. B. Wakefield, R. H. Poirier, and E. M. Glymph, Firestone Tire & Rubber Co., Akron.

Furfural Phenylhydrazone as a Chemical Softener for GR-S. In the development of new processing aids for synthetic rubbers, it has been discovered that the phenylhydrazones of furfural and of certain aromatic aldehydes show high activity as chemical softeners for GR-S. The p-bromophenylhdrazone and the α-naphthylhydrazone of furfural are also active softeners; while the p-nitrophenlhydrazone is not. The phenylhydrazones of various additional aldehydes and ketones are either inert or show a stiffening action under comparable conditions.

Furfural phenylhydrazone may be effectively used in two general procedures: (a) by incorporating the hydrazone into the GR-S polymer on the mill and either storing for two weeks at room temperature, or by oven-heating for a shorter period of time; (b) by dispersing the furfural phenylhydrazone in GR-S latex so that after coagulation, drying of the polymer and softening take place simultaneously.

Air appears necessary for the softener to function. No softening was observed when the polymer-hydrazone mixture was dried *in vacuo* after coagulation of the latex.

Tread compounds of increased plasticity may be prepared from the furfural phenylhydrazone softened polymers.

It has been found that stiff, non-processable, high-Mooney polymers (ML 4/212= 75 to 130) may be softened to equal regular GR-S of specfication Mooney (ML 4/212 = 45 to 55) in processing characteristics, yet the vulcanizates retain many of the superior properties of the high-Mooney rubber, such as higher aged tensile, elongation, and crack growth resistance. Thus plasticization and improved processability of these polymers and stocks have been achieved without any additional operation other than that of mixing the furfural phenylhydrazone dispersion into the latex. J. C. Ambelang, G. E. P. Smith, Jr, and G. W. Gottschalk, Firestone.

Dome-Type Calender Crowning. Lower gum gages, lower fabric gages, and the utilization of synthetic polymers have necessitated more accurate calendering and calender crowning. Early trials with synthetic rubber stocks indicated that the conventional crowns used for natural rubber were not only too low, but these crowns rather than producing a gum sheet of even gage, or of gradual increasing gage at the center, produced a gum sheet with a rather pronounced hump at the center.

As the purpose of the crown on the top roll is to compensate for the deflection of the rolls, it was questioned whether the method of crowning based upon the deflection of an evenly loaded free-end beam was the most desirable crown.

Considering the calender roll as semi-rigidly fixed in the bearings, one would expect the deflection of the rolls under load to approximate that of a fixed-end beam under uniform load. This was borne out by the shapes of the gum contours obtained on the under crowned calenders. On this basis was developed what has become known as the "dome-type crown." This crown is an average between the deflection of a fixed-end beam and the deflection of a free-end beam under uniform load. Calenders replaced with this type-crown have given more uniform gage gum sheets and are giving satisfactory production performance. H. S. Sell.

The Effect of Airbag Thickness on the Cure of a 6.00x16 Tire. Airbags of various thicknesses are used to cure a pneumatic tire. A cure study, by means of thermocouples shows: (1) effect of varying bag wall thickness on general tire cure; (2) marked effect of a thick or thin airbag base on tire bead cure; (3) How to adjust the cure cycle with a given bag to obtain proper tire cure. It is concluded that tire cure through a given point in the tire depends upon the total thickness of the tire alone. Increase in bag thickness subtracts cure from the tire at the point of increase. This cure retardation is greatest at the inner tire carcass and diminishes in intensity toward the outer tire next to the mold. H. A. Freeman, Goodyear.

TUESDAY MORNING — MAY 27

The Effect of Carbon Blacks on the Swelling of Neoprene GR-M-10 Vulcanizates. Variations in the type of carbon black affect the volume increases of Neoprene GR-M-10 vulcanizates after immersion in standard test media. It has been found that in the case of carbon black loadings the swelling characteristics of the vulcanizates are dependent on other factors in addition to volume dilution. Degree of swelling at any given loading varies in inverse order to the surface area of the carbon black.

A study of volume increases data over a range of carbon black loading shows that the swelling values decrease most rapidly with increased loading at low loadings. At higher loadings, when the degree of loading varies with the type of black, the decrease in swelling for a given black becomes proportional to the increase in loading. This action indicates different reinforcement effects of the carbon blacks up to certain loading ratios—beyond which point additional carbon black serves only as an elastomer diluent.

Nineteen different carbon blacks representing 11 official classifications were studied in a compound containing 30 volumes of carbon black to 100 volumes of neoprene elastomer. At this loading the limit of reinforcement had been reached for all types of carbon black. Five carbon blacks representative of channel, furnace, and thermal types also were studied over a range of loading ratios.

Test conditions used were immersion for seven and 14 days at 212° F. in ASTM petroleum base oil No. 3 and seven days at 82° F. in ASTM Reference Fuel No. 1. N. L. Catton and D. C. Thompson, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

A Study of the Effect of Carbon Black on the Swelling Properties of Loaded GR-S Stocks. A relation between the extensibility and the swelling of rubber has been known to exist for some time. Recent work has shown that since both these phenomena depend on the same structural variables, a quantitative relationship can be derived.

In the more complicated situation of loaded rubber stocks containing reinforcing or non-reinforcing fillers there is superimposed on the structural factors influencing the properties of the rubber phase other factors associated with the properties of the filler. The relation between "modulus" and swelling in these cases is shown to depend upon the properties of various types and grades of black.

If a plot is made of the logarithm of the "modulus" versus the logarithm of the swelling ratio of a stock loaded with a non-reinforcing black, the points corresponding to different cures and different loadings can all be represented by a single

straight line. In the case of the reinforcing fillers, dependency on the loading is observed, contrary to the above. A number of such plots for blacks of varying reinforcing ability is presented.

A study was made to determine the effect of various types of black on the swelling of the rubber constituent in loaded vulcanized and unvulcanized GR-S stocks. The swelling ratio of the rubber constituent was not influenced significantly by the different types of black. Reinforcing and non-reinforcing blacks affected the swelling of the GR-S to the same degree. These results would contradict any explanation of reinforcement based as a cross-linking agent or physically adsorbs a portion of the rubber medium. E. M. Dannenberg, Godfrey L. Cabot, Inc., Boston, Mass.

Effect of Silicone Oils on the Physical Properties of Rubber Stocks. Rubber softeners have been classified according to their solubility characteristics. The more soluble softeners have greater compatibility with rubber and give soft, nervy stocks; the less soluble softeners function through a lubrication action, are only partially compatible, and in time the excess tends to bleed or bloom. The discovery of the silicone oils naturally suggested investigation of their behavior as a rubber compounding ingredient; they are totally incompatibile with rubber. The work presented deals for the most part with silicone oil in carbon black loaded rubber stocks.

The fundamental principle of the incorporation process depends on the black acting as a carrier for the oil. This can be accomplished either by premixing the oil with the black or by adding the oil to a black-rubber mix in the Banbury at a stage in the mixing cycle where the black is not at all wetted by or dispersed in the rubber. Experimental work involved investigation of the problems of incorporation of silicone oil directly into the rubber-black mix during compounding, with observation of processing behavior and effects on the physical properties of the vulcanizate.

Physical test data are presented showing performances of vulcanizates containing various oil loadings. Several different blacks are investigated. Softeners with variations and substitutions are also studied.

The improvement in abrasion resistance of both channel and furnace blacks is the outstanding effect of the use of silicone oil. Improved extrudibility and appearance of the vulcanizates are also found. Abraded surfaces display much finer texture.

Preliminary work included silicone oil treatment of blacks and siliceous pigments; interesting hydrophobic products resulted, and the treated pigments were easily dispersed in rubber. H. J. Collyer, Cabot.

A Contribution to the Study of the Carbon Black Particle. I. The particle configuration of some common rubber carbon blacks. Electron micrographs which show particle configuration in addition to the usual profile outline have been obtained with carbon blacks milled in rubber. Typical blacks which have been thus examined are V6, Gastex, Philblack A, Statex A, Shawinigan, and P33.

Variously odd shaped particles are present in any black, but each type of black has some distinguishing configurations; i.e., each set of controlled conditions used in making carbon blacks determines the distinctive character of the size and configuration of the particles produced. Because they resemble aggregates, these odd shaped single particles are termed "pseudo-aggregates." These have constrictions and smoothly curved portions between the constrictions. The curved portion between the constrictions is the sub-unit. The size, number, and arrangement of the sub-units determine the particle configuration. Exceptions to this constricted and curved sub-unit construction are the spheres occuring in varying quantities in some blacks and the hexagonal plates in Shawinigan black.

For the microscopic classification of the particles, the configurations have been divided into (1) non-linear, i.e., spheres, approximate spheres, and compact clusters; and (2) linear, i.e., non-branching, simple branching, mutiple branching, rangy, stocky, and flat clusters. A table listing the various configurations as they occur in the blacks examined is given, and the size range of the sub-units of the different blacks is included.

An interesting particle growth mechanism has been hypothesized, and particles constructed according to the hypothesis correspond closely in appearance to the observed particles.

The results given in this paper are based on electron micrographs having a resolution of 30 to 50 A.

Evidence that the light microscope dark-field counting method can give a reliable measure of the average diameter of carbon black particles has been obtained. Using a super-fine black, enough particles can be counted to give an average particle diameter of 0.026-micron. Therefore it is likely that practically all of particles of Micronex were counted by the dark-field counting method which gave a diameter of 0.06-micron, especially since the electron microscope shows Micronex to have only a moderate variation in particle size.

Exception is taken to the presence of the "carbon-rod-linkage" in electron micrographs of P-33 and Thermax presented by earlier investigators because the apparent rod connection is an artifact. The formation of an artifact rod between any curved profiles slightly overlapped, in contact, or just separated is a general phenomenon in the electron microscope image and is present regardless of degree of resolution obtained to date. L. H. Willisford, Goodyear.

Today's Furnace Blacks. Today furnance blacks hold a strong position in carbon black manufacture and demand attention by both producer and consumer. Accounting for half of last year's total carbon black production, furnace blacks offer to consuming industries a wide range of characteristics and varied performance in compounded rubber. Developments in methods of manufacture have resulted in better processing and stronger reinforcing blacks. Some furnace blacks already vie with channel black where maximum reinforcement and resistance to wear are prerequisites.

Today's furnace blacks are discussed by the authors from various angles covering: (1) manufacturing processes, producers, patents, location of plants, yields, selling prices, growth in production since 1935, and the breakdown of 1946 production; (2) classification as to types and brands; (3) physical and chemical characteristics of 15 furnace blacks, two channel blacks, acetylene black, and two German blacks; (4) a general comparison in natural rubber and GR-S of 24 furnace blacks, two channel blacks, acetylene black, and two German blacks; (5) reduced acceleration in natural rubber and GR-S for six furnace blacks and one channel black; (6) blends of a reinforcing black with two lesser reinforcing furnace blacks, two different channel blacks, and a highly acidic black, in natural rubber and GR-S; (7) increased black loadings in natural rubber and GR-S for six furnace blacks and one channel black; (8) the effect of seven different accelerators on six furnace blacks and one channel black in natural rubber and GR-S; (9) a comparison of six furnace blacks and one channel black in natural and six synthetic rubbers. Illustrations and rubber data are provided.

The importance of furnace black in solving postwar tire problems cannot be overlooked. The blacks with superior processing and high reinforcing qualities will induce better performance of GR-S treads. Properly accelerated, they should do equally as well in natural rubber treads. The role of furnace blacks in natural rubber will be selective and will be governed by the properties of the black. I. Drogin and H. R. Bishop, United Carbon Co., Inc., Charleston, W. Va.

The Oxidation of Carbon Blacks. The oxidation of carbon blacks at moderate temperatures is another means for developing information pertinent to the structure of the carbon black particle. The oxidation process used is such that carbon blacks can be completely oxidized slowly without the ordinary type of combustion. The products of oxidation at any point short of complete oxidation, are water, carbon dioxide, carbon monoxide, and a residual sample enriched in oxygen.

Four channel blacks and five furnace blacks were studied.

The ratio of hydrogen to carbon in the oxidation products varies throughout the entire process of oxidation, and this variation, insofar as furnace blacks are concerned, is consistent with their performance in rubbers.

No correlation in general can be found between the actual amount of oxygen which carbon blacks are capable of adsorbing and rubber properties. However the evidence points to a close correlation between the relative point during oxidation at which the maximum volume of oxygen is adsorbed and the general rubber characteristics of carbon blacks.

Carbon blacks may have individual identity insofar as the distribution of hydrogen throughout the ultimate particle is concerned. There may also be type identity. It is proposed that the dominant feature of a carbon black particle is its electrical character, and this electrical character is identified by the relative number and distribution of hydrogen atoms throughout the particle and by the amount of oxygen associated at its surface. C. W. Snow, D. R. Wallace, and A. L. Sweigart, United Carbon, Borger, Tex.

Processing of Channel Blacks in a GR-S Tread Stock. A shortage of channel blacks was encountered in 1945 which necessitated some uncompensated blending of these blacks to meet production demands. Consequently, it was desired to know the processing effects resulting from the interchange of various channel blacks in an EPC GR-S tread stock.

Three blacks, commonly known as medium and hard processing channel black and a conductive channel black, were substituted in a 45-part EPC GR-S tread stock and compared with an EPC control. Factory runs showed higher Mooney viscosities, mixing temperatures, and power requirements, higher extrusion temperatures and rougher tubing in the direction of EPC to HPC to CC. Most of the differences noted were small, but potential trouble was indicated in the case of Mooney viscosities and tubing characteristics. It required 32.9% increase in total mixing time to make EPC and HPC tube nearly alike. Although the difference between EPC and MPC was smaller, an MPC tread tubed

with a wide, thin sidewall would give trouble.

Large mixing volumes demand maximum processing efficiencies (i.e., the least possible amount of mixing). MPC, HPC, and CC blacks are a processing detriment in such a system. G. L. Brown, Goodyear.

X-Ray Diffraction Studies of Some Synthetic Rubbers at Low Temperatures. E. E. Hanson and G. Halverson, Firestone.

Thermodynamics of Crystallization in High Polymers. P. J. Flory Goodyear.

TUESDAY AFTERNOON-MAY 27

Vulcanization of Rubber. I. Stoichiometry of the Cross-Linking Reaction. B. C. Barton and E. J. Hart, United States Rubber Co., Passaic, N. J.

Sulfur Linkage in Vulcanized Rubber. IV. Further Studies on the Reaction of Methyl Iodide with Sulfur Compounds. The removal of combined sulfur from vulcanized rubber as trimethyl sulfonium iodide on treatment with methyl iodide at room temperature has been persuasive evidence of the presence of sulfide sulfur linked to allylic-type residues. The evidence offered in the past did not constitute exclusive proof since it was not known whether still other types of sulfur linkage than those investigated would also yield trimethyl sulfonium iodide. The present work adds to the known list of methyl iodide reactions those with *n*-butyl methallyl sulfide, allyl disulfide, allyl tetrasulfide, *n*-propyl tetrasulfide, and trithiane.

In 160 hours at 24° C. only very small amounts of trimethyl sulfonium iodide are produced by any of the above-mentioned sulfur compounds. Only the *n*-butyl methallyl sulfide linkage reacts with methyl iodide at a rate comparable to the rubber-sulfur vulcanizate reaction. The product, however, is the dimethyl *n*-butyl sulfonium iodide, not the trimethyl salt.. It is therefore unlikely that any of the sulfur linkages studied here is responsible for the rapid production of trimethyl sulfonium iodide from vulcanizates. The case for the presence of the diallylic sulfide linkage in rubber-sulfur vulcanizates is thereby strengthened.

An important factor has been neglected in the methyl iodide-vulcanizate experiments. No evidence was obtained that all the sulfur removable by the reaction was in the form of trimethyl sulfonium iodide. The reacted vulcanizate was always acetone-extracted before analysis. This extraction may have decomposed those sulfonium compounds whose hydrocarbon residues were the rubber chains. Future experiments should distinguish between sulfur removed as trimethyl sulfonium iodide and that removed as decomposition products of other sufonium salts. M. L. Selker,[1] Bell Telephone Laboratories, Inc., Murry Hill, N. J.

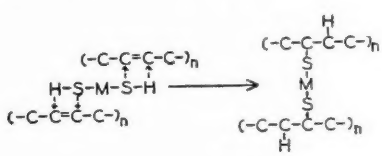
The Acetone Extraction of Vulcanizates. Study of the olefin-sulfur system to gain insight into the chemistry of sulfur vulcanization is now firmly established. Effort must be made, however, to obtain experimental verification of the facts derived from the simple system, on the vulcanizate itself.

The presence of polysulfides in vulcanizates is indicated by their predominant role in the products of the olefin-sulfur reaction. Present experiments involving hot acetone and cold isopentane extraction of a rubber-sulfur vulcanizate lend no support to the idea that polysulfides, if present, decompose on hot extraction to give extractable free sulfur.

However, hot acetone extraction increases the reactivity of rubber-sulfur stock towards methyl iodide. This is especially striking in the mercuric iodide catalyzed reaction. This increased removal of sulfur from acetone-extracted vulcanizate, as compared to unextracted vulcanizate, can be explained on the bases of conversion of polysulfides to more reactive sulfur links on hot acetone extraction.

Natural and GR-S ebonites lose about one-third of their combined sulfur on methyl iodide reaction at 24° C. with production of trimethyl sulfonium iodide. No evidence was obtained for the presence of polysulfides in 32% sulfur natural ebonite. M. L. Selker[1] and A. R. Kemp, Bell Laboratories.

Sulfur Bond in Vulcanizates. III. Vulcanization by Dimercaptans. In the previous papers of this series it was proposed that cross-linking during sulfur vulcanization may occur in part through mercaptan (or RS—) addition to double bonds. According to this proposal, it should be possible to effect cross-linking by means of a bifunctional mercaptan M $(SH)_2$, where M represents a hydrocarbon or other type of bivalent radical. This, in fact, has proved to be the case. Thus both natural rubber and GR-S have been subjected to vulcanization of this type. Presumably the reaction may be represented, in the case of a simple polybutadiene, as follows:



The following dimercaptans were prepared and used in this investigation: ethylene, trimethylene, tetramethylene, pentamethylene, decamethylene, bis (2-mercaptoethyl) ether, bis (2-mercaptoisopropyl) ether, and 1,3-dimercaptobenzene. The proportion of dimercaptans used was about 12 millimoles per 100 grams of GR-S. They were added dropwise as soon as the black stock smoothed out on the mill. Reaction takes place with extreme ease between GR-S and the lower molecular weight dimercaptans on a cold, tight mill, leading, in some cases, to severe scorching. Natural rubber behaves similarly, but less rapidly. The vigorousness of the reaction is an inverse function of the molecular weight in the polymethylene series. Substantial tensile properties were developed by the action of the dimercaptans on GR-S. Experiments with the use of filters for controlled photo-activation of the gelling of GR-S cements with dimercaptans have shown that only light below 5000 Å units is effective. (This is a contribution from the The Ohio State University Research Foundation Firestone Tire & Rubber Co. Project.) C. M. Hull, L. A. Weinland, S. R. Olsen, and W. G. France, Ohio State University, Columbus, O.

The Action of Certain Organic Accelerators in the Vulcanization of Rubber. IV. Electronic Effects. The effect of accelerator structure and alterations in it are summarized. Anilines, phenylene diamines, thioureas, and guanidines were used in the comparisons made. Resonance in the molecule or its subsituted groups was found of primary importance. For aniline, methyl aniline, and dimethyl aniline, the logarithms of their dissociation constants were found to bear a linear relation to the sulfur combined. The same relation was found for the o—, m—, and p— phenylene diamines. Replacement effects of resonant and aliphatic groups in the latter series are compared.

Similar relations were found to occur in the substituted thioureas; the resonant phenyl group decreases the activity of acceleration as compared with an aliphatic group in the same position. The accelerating effect of the subsituted thioureas was found to be of the following order: alkyl> dialkyl> allyl> phenyl> diphenyl. Currently, dissociation constants for this series are not available.

The accelerating activities of phenyl substituted guanidines lie in the order of their dissociation constants MPG> DPG> TPG, with the first two fairly close together, the last much lower. TPG and guanidine, with a 40,000-fold difference in their dissociation constants, produce comparable acceleration.

Results with sodium hydroxide compare with those for guanidine. Evidently these very strong bases exercise a different effect than the weaker bases, and an explanation for the sharp distinction in accelerating behavior needs to be found. Despite the 40,000-fold difference in their dissociation constants, guanidine and TPG should be capable of the same sort of resonance, and their similar low-order capacity for acceleration may have a related explanation. G. D. Kratz and I. Katz, Norwalk Tire & Rubber Co., Norwalk, Conn., and H. H. Young, Jr., Columbia University, New York.

Effect of Certain Antioxidants in GR-S. I. Oxygen Absorption Studies. Comparison of the rates of oxygen absorption by GR-S polymers and vulcanizates with varying amounts of phenyl-β-naphthylamine indicates that the optimum concentration is about 1%. Higher concentrations of this antioxidant result in an increased rate of oxgen absorption during the constant rate stage, and thus the excess antioxidant functions as a catalyst for this stage even though it is at the same time delaying the start of the autocatalytic stage of oxidation.

Coagulation of GR-S by the alum method is shown to result in a considerably greater resistance to oxidation as compared to a polymer coagulated by the salt-acid method. The difference is much less in the case of the vulcanizates although the alum vulcanizates are shown to absorb oxygen at a somewhat slower rate in all cases studied.

Oxygen absorption measurements demonstrate a considerable difference in the effectiveness of three common antioxidants. It is also shown that the rating of antioxidants, as determined in GR-S polymer, may be completely reversed when they are compared in the vulcanizates. Comparison of oxygen absorption data with the results of natural and artificial aging, as presented in Part II, which follows this paper, shows good correlation and demonstrates the value of the oxygen absorption method for evaluating antioxidant activity. (Work done as part of the Firestone Tire & Rubber Co. Research Fellowship at Case School of Applied Science.) H. Winn and J. R. Shelton, Case School of Applied Science, Cleveland.

II. Natural and Accelerated Aging. A concentration of 1% of phenyl-β-naphthylamine appears to give maximum protection to GR-S during both natural aging (five years) and oven aging (four days at 90° C.) of the polymer. No advantage could be shown for using larger concentrations, but 0.5% of this antioxidant gave inferior protection.

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In the case of 2,2,4-trimethyl-6-phenyl-1, 2-dihydroquinoline, a concentration of about 2% was necessary for maximum protection to the polymer during natural and oven aging.

In polymer aging, phenyl-β-naphthylamine gave somewhat better protection than dimethylacridane, heptylated diphenylamine, or 2,2,4 - trimethyl - 6 - phenyl - 1,2-dihydroquinoline.

In vulcanizate aging, only small differences occurred between different concentrations of antioxidants and the different antioxidants evaluated.

Where these comparisons were possible, there was good correlation between the results of this part of the paper and the oxygen absorption studies of Part I. (above). H. E. Albert, Firestone.

The Behavior of Silastic on Aging. Silicone elastomers, like other silicone materials, are built on a molecular skeleton of alternate silicon and oxygen atoms. The inherent stability of this silicon-oxygen linkage implies unusual resistance to change or deterioration caused by aging. Stability studies were therefore made by exposing compounded dimethyl silicone elastomers, known under the trade name of Silastic, to conditions which commonly cause organic rubbers to deteriorate. Among the conditions which generally cause temporary or permanent change in natural or synthetic organic elastomers are high and low temperatures, exposure to oils, chemicals, and weathering including the combined action of ultra-violet radiation, moisture, ozone, and oxygen.

The stability of Silastic was determined by measuring changes in tensile strength, elongation, hardness, elasticity, weight, volume, and flexibility after long exposure to conditions which generally cause other rubbers to deteriorate. These tests show that silicone rubber does have unusual resistance to change after prolonged exposure to temperatures as high as 300° F. and as low as —70° F. These tests also show that Silastic is exceptionally resistant to change after long exposure to outdoor weathering, aging in a Weather-O-Meter, and after exposure to certain oils and chemicals. Moreover, these tests give further support to the hypothesis that stability is inherent in the silicone polymer because resistance to one set of conditions is not developed by special formation at the expense of resistance to other kinds of aging. Both high and low temperature stability together with weather and chemical resistance are found characteristic of these silicone elastomers. R. R. Selfridge, G. M. Konkle, and P. C. Servais, Dow Corning Corp., Midland, Mich.

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Stability of High Polymer Latices to Acidification. The presence of certain stabilizing agents makes it possible to acidify sodium rosinate dispersions of polychloroprene (neoprene) without coagulation. The activity of such stabilizing agents appears closely connected with their geometrical configurations. β-naphthalene sulfonic acid is an effective material for this use, but α-naphthalene sulfonic acid is ineffective. Condensation of β-naphthalene sulfonic acid with formaldehyde increases its effectiveness, but condensation of the α-isomer gives a coagulating agent. Condensation products of mixed naphthalene sulfonic acids are effective dispersing agents for neoprene latices provided a critical concentration of 15 to 18% of α-naphthalene sulfonic acid in the mixed acids is not exceeded.

Examination of a selected number of toluene and xylene sulfonic acids shows that a methyl group meta to the sulfonic acid group increases the dispersing activity, but methyl groups in ortho or para positions do not.

It is believed that both α- and β-naphthalene sulfonic acids can be absorbed on the colloidal particle, but that only the β-isomer can produce a closely packed film. Examination of molecular models supports this hypothesis. R. S. Barrows and G. W. Scott, du Pont.

Latex "Strainability" Test. This paper describes a latex test, the "strainability," for processing latices and latex compounds. The presence of fine coagulum in latex effects some processes very adversely. This coagulum is often wrongly blamed on some complicated chemical or physical action in the compound when the true explanation is that all the larger particles were present in the original latex or pastes from which the compound was made. The latex "strainability" test measures the amount of latex that will pass through a filter medium before clogging.

The equipment required and the method of making the test are described. Factors affecting test results are discussed. Examples are given of the use of the test in control and handling of raw latex, in the development of improved pastes for latex compounding, and in studying the interactions of ingredients within a latex compound. P. D. Brass and D. G. Slovin, U. S. Rubber, Providence, R. I.

The Brabender Plastograph in the Rubber Laboratory. The Brabender plastograph is a small jacketed internal mixer so designed that the torque required to turn the rotors in the material being handled can be recorded on a strip chart. One of these instruments has been modified in several respects to make it more suitable for handling rubbers. The breakdown rates of natural rubber and GR-S were compared inthis modified instrument, over a range of temperatures from 100to 160° C.

Butadiene-styrene (72/28) copolymers prepared in a range of Mooney values using dodecylmercaptan (DDM) and mixed tertiary mercaptan (MTM), when tested in the plastograph at 150° C., showed that the rate of softening decreased with an increase in Mooney value and that the type of modifier had an important effect on the rate of softening. The plastograph results in this case were confirmed by factory processing experience.

The effect of chemical peptizing agents on the rate of softening of various rubbers can be readily determined in the plastograph. Typical curves obtained on both GR-S and natural rubber using RPA No. 3 and Pepton 22 are shown.

The small size sample required for a mastication test (approximately 60 cc.) combined with the good reproducibility of successive tests on the same material makes this apparatus of considerable interest in the study of the performance of natural and synthetic rubbers under conditions resembling those prevailing in large-scale processing equipment. While little work has been done on its use as a mixer, the plastograph should also be of interest in the laboratory study of this operation. E. A. Juve and D. C. Hay, B. F. Goodrich Co., Akron.

Scorch Rate and Cure Rate Measurements at Various Temperatures Using the Mooney Plastometer. The time of heating required for scorching of a vulcanizable mixture to occur and the rate at which vulcanization proceeds beyond this point can be measured with good precision in a Mooney plastometer. These rates may be determined over a temperature range to include both processing and curing temperatures.

A series of these tests was run on compositions including a pure gum natural rubber, a natural rubber tread stock, a GR-S tread stock, a GR-S stock compounded with inorganic pigments, a GR-S inner tube stock, and a Hycar OR-15 tread-type stock.

To calculate the temperature coefficients of the two rates it was necessary that the impressed temperature be accurately controlled and that the actual temperature of the specimen be known, especially during the warm-up period. A correction for the curing effect of the latter was necessary.

The temperature coefficient of the scorch rate for the composition tested was found to vary from 2.0 to 2.4, and the temperature coefficient of the cure rate from 1.4 to 2.3. The coefficient for the combined overall rate varied from 1.9 to 2.3.

As a check on the cure procedure, a method was used for curing thin sheets over a range of times and temperatures with negligible time lag in attaining the impressed temperatures. Several of the test compositions were cured in this way, and from the stress-strain data obtained the temperature coefficient of the cure rate was calculated. The agreement between this figure and those obtained from the Mooney data was good and shows that the Mooney cure procedure at different temperatures can be used as a very fast method for determining the temperature coefficient of either the scorch or cure rate. R. Shearer, A. E. Juve, and J. H. Musch, Goodrich.

Comparison of Creep with Some Conventional Aging Methods for Elastomers. Elastomers behave in a very complicated manner when subjected to mechanical stresses. From recent theoretical researches of Tobolsky and co-workers it appears that the chemical reactions at elevated temperatures causing oxidation and cross-linking in elastomers are fundamentally exhibited by creep and stress relaxation measurements. These interrelated functions have been used in this paper as a convenient means of studying the relative behavior of antioxidants and accelerators in *Hevea* and GR-S rubbers.

Tests conducted on several representative *Hevea* rubber stocks containing different pigments show that creep behavior differentiates more clearly between antioxidants than do conventional aging tests. Creep measurements show that the relation between the effectiveness of various antioxidants are independent of the accelerator or state of cure. Different accelerators in *Hevea* stocks containing the same antioxidant are found to have widely different creep rates which correlate well with conventional aging data. Creep tests are also shown which differentiate GR-S tread stocks containing various antioxidants, although conventional aging tests indicate them to be alike.

The relation of continuous creep behavior with continuous and intermittant stress relaxation is shown in a typical *Hevea* vulcanizate containing permutations of three types of antioxidants with three types of accelerators. By either method the rating of the antioxidant is the same for all three types of accelerators. M. C. Throdahl, Monsanto Chemical Co. Nitro, W. Va.

Effect of Storage and Temperature on Flexibility of Natural and Synthetic Rubber. A new method for measuring the flexibility of rubber is described. The method essentially consists of determining the stress-strain curve obtained by loading and unloading a loop formed from a one-by six-inch strip cut from a test slab. A stiffness coefficient independent of the thickness of the sample and a resilience coefficient are obtained.

Using the method described, the behavior

of various natural and synthetic rubber gas-mask facepiece compounds is studied during one month to three months' exposure at various temperatures down to 20° F. Progressive stiffening, probably due to crystallization, is shown for natural rubber, GR-I, and GR-M compounds at the low temperatures. No tendency to crystallize was noted for the GR-S compound. Of the crystallizable polymers GR-I was the most resistant and GR-M the least resistant to low temperature storage.

The effect of crystallization and second-order transition on the changes in flexibility due to storage at low temperatures is illustrated and discussed.

Disregarding the inherent differences between elastomers, the low temperature resistance of elastomer compounds is indicated to be favored by use of interpolymers, full cure, and low-temperature-resistant plasticizers. J. B. Gregory,[2] I. Pockel,[3] and J. F. Stiff,[4] CWS Development Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

A Study of the Frictional Properties of Tread-Type Compounds on Ice. Apparatus and techniques for the measurement of coefficients of dynamic and static friction of tread-type stocks on ice are described. Both coefficients are shown to increase with increased age of the ice or with a decrease in temperature. An increase in vertical loading pressure decreased the dynamic value more than it did the static. In general, very little relation was found between coefficients of friction on ice and hardness, stiffness or hysteresis defect. The coefficients are shown, however, to be very sensitive to type and amount of softener or black. In such cases the softer stock usually gave higher values. *Hevea, acid emulsion butadiene/styrene, polyisoprene* and *GR-S/Hevea* blends gave higher coefficients of friction than did any of the other polymers studied. In some cases ice pick up is shown to decrease the coefficient of dynamic friction. Correlation with road test results show the laboratory test to be valid. It is also shown that the coefficients of both dynamic and static friction must be high to insure superior tire performance on ice. F. S. Conant, J. L. Dum, and C. M. Cox, Firestone.

Quantitative Estimation of GR-S in Rubber Reclaim. The amount of GR-S present in reclaim is of technological interest to the rubber compounder. Inasmuch as GR-S practically does not take part in the formation of acetic acid by the chromic acid oxidation method of analysis, its quantitative estimation in mixtures with natural rubber could be worked out on the basis of the rubber hydrocarbon content by difference, taking into account the sum total of polymers present, and the determination of the natural rubber hydrocarbon by direct analysis. Analysis of a series of experimental reclaim mixtures proved the direct rubber hydrocarbon a function of the natural rubber present. However, when introducing the values for the rubber hydrocarbon by difference into the calculations considerable errors in estimation were found rendering the method useless.

It is well known to the reclaiming industry that for one and the same *natural* rubber reclaim the values obtained for the rubber hydrocarbon content by difference and by direct analysis deviate from each other; the latter is usually smaller than the former. Critical examination of data obtained from a great number of natural rubber reclaims over a period of years revealed that the size of this deviation can be traced to the origin of the scrap used in the particular reclaim; each kind of scrap (peel, carcass, tires) causes a characteristic deviation. If this deviation is introduced in the form of a correction factor, the method of estimating GR-S in reclaim mixtures as outlined above becomes accurate enough to be applicable (error ± 2.5% polymer). Limitations of this simple method are discussed; working examples and graphs are given for each step. D. S. le Beau, Midwest Rubber Reclaiming Co., East St. Louis, Ill.

Reclaiming Agents for Synthetic Rubber. With the advent of synthetic rubbers during the recent war emergency, the problem of reclaiming these new products became of vital interest to the rubber industry. Preliminary experiments showed that the methods previously used for reclaiming vulcanized natural rubber scrap were ineffective when used on vulcanized butadiene-styrene type copolymers, such as GR-S. Hence it was found necessary to discover and utilize chemicals which would act as active reclaiming agents in catalyzing the reactions taking place during the reclaiming operations for GR-S.

Materials which have been used as reclaiming agents, both in this country and abroad, have been aryl mercaptans and high molecular weight aliphatic amines. This communication reports the results of a number of tests in which it is shown that certain highly alkylated phenol sulfides are among the most active reclaiming agents known. Their use in the correct proportions, together with the proper swelling agents and tackifiers, has resulted in the production of reclaims from GR-S and other synthetic elastomers which compare favorably with natural rubber reclaim in processability, compatibility, and physical properties, both cured and uncured.

A discussion of the mechanism of the reclaiming processes for both natural and synthetic rubbers based on the available evidence indicates that the predominant chemical reaction taking place during the reclaiming process is one of oxidative degradation or chain scission. The reaction is similar to the oxidative chain scission taking place during the natural and accelerated aging of hydrocarbon polymers. This oxidative degradation probably is catalyzed by the reclaiming agent through a radical chain mechanism. W. S. Cook, H. E. Albert, F. L. Kilbourne, and G. E. P. Smith, Jr., Firestone.

C. I. C. Rubber Division Meeting

THE Rubber Division of the Chemical Institute of Canada will meet with the Institute at the annual conference, to be held at the Banff Springs Hotel, Banff, Alta., on June 8 to 11. The division will sponsor Canada's first synthetic rubber symposium at that time, and it is anxious to have American research men attend the symposium and meetings. Although final arrangements for the program have not as yet been made, abstracts of the papers to be presented are given below.

"The Physical Testing of Experimental Elastomers." Equipment and methods used to test experimental and control-type elastomers are described. Problems involved in testing experimental polymers are discussed, with particular reference to the effects of the mechanical or thermal breakdown required before compounding pigments can be added to the polymer on a laboratory mill. The processing step is often sufficient to alter radically the molecular characteristics of the polymer and thus prevent correlation of polymerization and physical test data. Results of variations of the components of trend stock formulae are reported. Experimental methods and results for butadiene-styrene-type copolymers are described for the following tests: (a) stress-strain; (b) rebound; (c) flex crack resistance; (d) extrusion; (e) low temperature stiffening; and (f) rate of retraction. S. T. Bowell and N. R. Legge, Polymer Corp., Ltd., Sarnia, Ont.

"The Preparation of Controlled Molecular Weight Distribution Butadiene-Styrene Copolymers Using Tertiary C_{16} Mercaptan as Regulator." Synthetic rubber is produced largely by reaction of the hydrocarbon monomers in aqueous emulsion stabilized with soap. The molecular weight and the molecular weight distribution are regulated by the addition of various compounds, notably mercaptans. The merchants vary widely in their effects, and some: namely, the tertiary C_{16} mercaptans, disappear more slowly so that their effective concentration remains more nearly constant at least for a relatively longer period of time than for other mercaptans. This more uniform regulating action may be utilized to prepare synthetic rubbers with narrower molecular weight distributions than production GR-S. H. L. Williams, Polymer Corp.

"The Effect of Temperature and Mixed-Solvent Composition on the Intrinsic Viscosity of GR-S". The intrinsic viscosity of a sample of standard GR-S has been measured at temperatures ranging from 0 to 65° C. in several solvents made progressively "poorer" (to the point of precipitation) by the addition of non-solvent. The results afford strong evidence in support of the theory (Flory; Alfrey, Bartovics, and Mark) that intrinsic viscosity is very sensitive to the shape assumed by a flexible long-chain molecule in solution. Measurements with various systems of the type GR-S-solvent-non-solvent indicate that the intrinsic viscosity at the precipitation point is the same with different non-solvents and, to a first approximation, with different solvents. This intrinsic viscosity is, moreover, independent of temperature. L. H. Cragg and T. M. Rogers, McMaster University, Hamilton, Ont.

"Combined Ratios of Monomers in Bulk and Emulsion Copolymerizations." The copolymerization equation of Mayo and Lewis[1] has been shown in these laboratories to describe the bulk and emulsion copolymerizations of styrene, acrylonitrile, butadiene, isoprene, and chloroprene, using two monomers at a time. The compositions of copolymers prepared in emulsion were found to be independent of catalyst, modifier, phase-ratio, and air-inhibition. Evidence was obtained that the same free-radical mechanism applies to both bulk and emulsion copolymerizations, and that true copolymer chains are formed in both systems. The relative reactivity of the five monomers with each of the five radical types was found to be specific for each radical. K. R. Henery-Logan, M. Morton, and R. V. V. Nicholls, McGill University, Montreal, P. Q.

[2]Present business connection: Frederick S. Baron Laboratories, Watertown, Mass.
[3]Present business connection: Cambridge Industries, Inc., Cambridge, Mass.
[4]Present business connection: Binney & Smith Co., New York.

[1]*J. Am. Chem. Soc.*, 66, 1594 (1944).

"The Mechanism of Sodium Catalyzed Polymerization of Butadiene in Toluene." Attempts to obtain evidence supporting a free radical mechanism for the sodium-catalyzed polymerization of butadiene in toluene failed. Indirect evidence is presented to support the initial formation of a disodium addend with butadiene. This is followed by either the addition of another molecule of butadiene, or far more frequently by transmetallation with toluene to give sodium benzyl. The high proportion of phenylalkyl chains indicates that the major part of the polymerization involves chain initiation by sodium benzyl and chain termination by reaction with toluene to regenerate the sodium benzyl. R. E. Robertson and L. Marion, National Research Council, Ottawa, Ont.

"The Mechanism of Popcorn Formation." A kinetic study of popcorn formation in solutions of butadiene in styrene indicates that the free radicals necessary for the polymerization are produced initially on the seed by decomposition of hydroperoxides. A further reaction involving opening of double bonds in reacting chains leads also to radical formation. The function of butadiene is to supply double bonds to the chain and thus enable branching to occur. C. A. Winkler, McGill U.

"Some Recent Developments of the British Plastics Industry." Certain specialty applications developed in the United Kingdom for plastics of various types are discussed. Information on many of these special applications has not hitherto been fully published, and the examples will cover all the major plastics types. One of the subjects covered is the use of polyvinyl chloride paste for molding and fabric coating work. This product has been pioneered in England, and is only now being introduced on a production scale in Canada and the United States. P. A. Delafield, Distillers Co., Ltd., Group of Plastics Companies, and British Geon, Ltd., England.

CPA Consulting Technical Committee Meetings

AS PREVIOUSLY announced, INDIA RUBBER WORLD is publishing the minutes of meetings held by the technical consulting committees of the CPA Rubber Division. The minutes being published cover that part of the meetings which deals with the characteristics of synthetic rubbers that are not sufficiently satisfactory, and the recommendations of Rubber Reserve for the use of special GR-S types to counteract these inadequacies, according to the special needs of each rubber goods manufacturing group.

Wire and Cable Committee January 29 Meeting

The Wire and Cable Consulting Technical Committee held a meeting on January 29 in the Social Security Bldg., Washington, D. C. Government presiding officers were A. R. Miller, of OTC-CPA, and L. A. Woerner, of Rubber Reserve. R. A. Schatzel, of the Rome Cable Corp., was chairman of the meeting.

At the outset of the meeting the wire and cable industry was congratulated by OTC-CPA on the fact that it had, through cooperation with the producers of GR-S and diligent efforts, recognized the value of synthetic rubber. GR-S used by the companies represented was indicated as from 45 to 95% of their total rubber usage.

One company reported, "Many of us are more interested in getting sufficient quantities of GR-S rather than natural rubber. We find it superior in many respects." Another reported, "We have practically lost the know-how to work with natural rubber. In many cases our men have refused to work with natural rubber because they found it more difficult to handle."

Still another stated, "Had natural rubber been available in unlimited quantities during the war, we still would have had to have neoprene (GR-M). Neoprene was as important a military necessity as was rubber of any type and will continue to be."

Rubber Reserve representatives then presented a summary of current work on research and development, specifications, and production rearrangement as a matter of information for this group, as follows:

With regard to research and development, the Committee was advised that from the inception of the synthetic rubber program through 1945, efforts were directed toward producing a completely satisfactory general-purpose synthetic rubber. While strides were made in this direction, and a vast amount of background information was accumulated, the development of this superior general-purpose polymer was not completely successful. From this development work, however, has stemmed a number of special polymers for specific end-uses which probably will never be replaced by natural rubber; the GR-S-65, GR-S-60, and GR-S Blacks are on this list. Early in 1946 the board of managers for Office of Rubber Reserve research and development reaffirmed the direction of the program proceeding toward this goal, and to expedite the program the promising items of research and development were reorganized into definite projects either with a short- or a long-range objective.

The short range projects included: (a) chlorostyrene polymers; (b) alphamethylstyrene polymers; (c) isoprene polymers; (d) low reaction temperature polymers; and (e) the German Buna S-3 polymer. Long-range objectives included: (a) the development of analytical methods necessary to the quantitative determination of such properties as molecular weight, chain branching, molecular cross-linking, cis-trans isomerism, etc., with the objective of determining the effect of these properties on the end-product quality of the polymer; (b) the German "Redox" polymers; and (c) biochemical studies on formation of natural rubber.

This program is being actively pursued by means of contracts to 11 American universities and to eight industrial laboratories, with the results being completely followed through to tire testing or other end-product use. The hope was expressed that an integrated program for synthetic rubber research would be continued, whether directed by the government or private industry.

Specification improvement is being directed in several directions: (a) improvement of existing specifications tests and techniques and their reproducibility; this work is under way at the National Bureau of Standards and in laboratories of the industry; (b) introduction of more desirable tests. It is felt that this Committee might most effectively contribute to the latter. The Committee is invited to draft its recommendations along these lines for the consideration of Rubber Reserve. A table is attached for general information enumerating the specification test limits, average production values, and their standard deviations obtained during the last quarter of 1946 for the four types of GR-S used in the wire and cable industry: GR-S-65, GR-S (Naugatuck), GR-S-60 (formerly X-285), and GR-S-AC.

The Committee pointed out that when the present specification covering GR-S for wire and cable use was written, it primarily described the types supplied the industry at that time (GR-S Naugatuck and GR-S-AC, Lake Charles), rather than what the industry felt was a desirable product. However in drafting specifications it must be remembered that to be practical the product covered must be capable of being produced in plant equipment. Special polymer developments to be described in succeeding paragraphs may be helpful in determing the most desirable GR-S which can be produced under Rubber Reserve's present commitments. In the development of new tests and improvement of existing tests it might be desirable for the Committee to evaluate the methods to be proposed to Rubber Reserve by cross-check tests using all GR-S types being used in production as well as those to be hereinafter discussed.

The objective of this specification program is to provide a polymer to the consuming industry on an improved quality level and with improved uniformity. Rubber Reserve's function is to attempt to provide the best polymer which can be produced, production-wise, to fit, as nearly as possible, industry's bill of requirements. In the past three years more than 16 special-purpose GR-S polymers and in excess of 380 experimental GR-S polymers in regular production plant facilities have been produced in an effort to accomplish this objective.

Dating back to the very beginning of the synthetic rubber industry, this particular group has been very strong in its praise of Naugatuck GR-S. During the past emergency, part of the demand had to be supplied with Lake Charles GR-S-AC. At present Naugatuck is considered a latex plant, and while it will be necessary to produce a certain amount of dry polymer along with the latex, that dry polymer production will be very limited. Since it appeared that the Naugatuck finishing line was responsible for the highly prized characteristics of the GR-S for wire and cable use, consideration was given several years ago to the installation of this equipment at another plant of the low-cost type. The extremely limited availability of equipment at that time, as well as possible extra costs caused by the demands for the same equipment in all other copolymer plants, made this step impossible.

The Committee stated that, in view of the savings resultant from the improved processing of Naugatuck GR-S, the wire industry would be willing to pay a fraction of a cent more per pound as a premium. The Committee also made a strong representation to Rubber Reserve to continue the production of dry polymer at Naugatuck.

The Committee was advised that the production of GR-S-65 was shifted gradually from Institute to Firestone-Port Neches in December and January and that present production (February) would be entirely at Port Neches.

In the general discussion on new polymer development, the Committee indicated the factors listed below as the most important characteristics to be considered in a GR-S for their use:

(1) Good processing. Naugatuck GR-S was considered the best of the available types. Institute GR-S-65 caused some difficulties and in some cases had to be blended with Naugatuck GR-S or GR-S-60. Several companies reported that In-

Comparison of Chemical and Physical Properties of GR-S-Type Polymers for Wire and Cable — Fourth Quarter — 1946

Property	GR-S-65* Spec.	GR-S-65* Ave.	GR-S-65* S.D.†	GR-S‡ Spec.	GR-S‡ Ave.	GR-S‡ S.D.†	GR-S-60§ Spec.	GR-S-60§ Ave.	GR-S-AC¶ Spec.	GR-S-AC¶ Ave.	GR-S-AC¶ S.D.†
Ash (Total)	0.50% max.	.20	.08	1.50% max.	.49	.16	1.50% max.	1.01	1.00% max.	.52	.07
(Water soluble)	0.35% max.	.20	—	0.45% max.	.38	.10	Not spec.	—	.45% max.	.17	.07
Soap	0.25% max.	.03	.07	0.75% max.	.34	.09	0.75% max.	.15	.01% max.	.00	.00
Volatile matter	0.75% max.	.11	.10	0.50% max.	.11	.09	0.50% max.	.10	.50% max.	.16	.11
ETA extract	10.00% max.	7.17	.10	10.00% max.	7.50	.25	10.00% max.	8.10	10.00% max.	6.34	.16
Fatty acid	3.75% min. 6.00% max.	4.95	.10	3.75% min. 6.00% max.	4.87	.12	3.75% min. 6.00% max.	5.23	3.75% min. 6.00% max.	4.69	.12
Tensile p.s.i.											
50′ cure @ 292°	2600 min.	2902	93	2700 min.	3195	163	1800 min.	2175	2700 min.	3171	124
Elongation %											
50′ cure @ 292°	600 min.	705	34	550 min.	655	23	375 min.	471	500 min.	612	19
300% modulus p.s.i.											
25′ cure @ 292°	300 min. 600 max.	390	26	350 min. 650 max.	454	27	500 min. 900 max.	675	250 min. 550 max.	359	30
50′ cure @ 292°	700 min. 1100 max.	867	45	800 min. 1200 max.	1025	52	1000 min. 1450 max.	1230	650 min. 950 max.	814	35
90′ cure @ 292°	1050 min. 1450 max.	1225	49	1150 min. 1550 max.	1412	66	1450 min. 1950 max.	1685	950 min. 1350 max.	1138	39
Raw viscosity (Mooney) 4′ @ 212°	45 min. 55 max.	50.4	1.24	45 min. 55 max.	49.4	2.10	50 min. 65 max.	56.8	45 min. 55 max.	49.7	1.92
Compounded visc. (Mooney) 4′ @ 212°	73 max.	59.2	1.00	73 max.	64.0	2.19	125 max.	91.0	65 max.	59.8	1.96
William plasticity MM @ 10′ @ 70° C.	5.5 max.	4.23	.12	5.5 max.	4.23	.12	—	—	5.5 max.	4.02	.17
Williams recovery MM @ 10′ @ 70° C.	8.0 max.	5.90	.32	8.0 max.	5.90	.23	—	—	8.0 max.	5.52	.14
Water Absorption 20 hrs. @ 70° C., mg/cm²	5.5 max.	2.20	.19	5.5 max.	3.80	.41	—	—	5.5 max.	1.47	.27

†S.D. = Standard derivation

*U. S. Institute ‡U. S. Naugatuck §X-285 ¶Firestone, Lake Charles

stitute GR-S-65 contains hard spots in a softer matrix which were practically impossible to eliminate in breakdown. So-called "Crows feet" or Bamboo Canes" characterize the cured insulation. This matter is under investigation.

(2) Faster curing rate. Generally speaking, GR-S is somewhat slower curing than natural rubber. GR-S-AC is the slowest curing polymer of the GR-S types. X-344 (a non-staining variation of GR-S-60), X-362, and X-363, all of which are stabilized with IBUL or its sodium salt UBUF, are faster curing than standard GR-S. Rate of cure is particularly important for GR-S to be used in continuous vulcanization techniques.

(3) Good physical properties. GR-S-60 and other cross-linked polymers, X-344 and X-363, would be expected to have slightly lower physical properties than the standard GR-S types. However a reduction in acceleration ratio in mineral pigment in some cases will improve the physical properties.

(4) Low water absorption. Lower-water-absorption rubbers generally produce insulation compounds having superior electrical properties. However extremely low-water-absorption polymers are required only for specialty applications which would not cover more than 20% of the total rubber used by the industry. It is worth noting that very low-water-absorption GR-S may be obtained at no price differential from the standard types; whereas a premium price has been established on natural rubber types (deproteinized) having very low water soluble materials. X-361 has been developed and is being sampled to the industry, having extremely low water absorption characteristics comparable to deproteinized or washed natural rubber.

(5) Non-staining. Reports on existing non-staining GR-S types indicated that several improvements were desired. GR-S-25, stabilized with EFED, has excellent non-staining properties, but has an odor somewhat disagreeable to workmen handling it. GR-S-50 has very good aging properties, resulting from the use of Stalite as a stabilizer, and while it has much better non-staining characteristics than standard antioxidants, it is not so good as GR-S-25 in this property. Many products in the electrical lines are manufactured without knowing whether they will be called upon in service to be non-staining. In such cases a non-staining polymer must be used as a safeguard. Several developments in this line are non-staining, low-water-absorption GR-S types, X-362 and X-363 which have been prepared for this group.

(6) Uniformity. GR-S polymers in general are credited with a much greater degree of uniformity than natural rubbers. Processing and rate of cure, particularly, are included under this designation. Rubber Reserve is continuing to strive toward improved uniformity of all factors contributing to improved GR-S. Naugatuck GR-S was considered by the Committee to be more uniform than Lake Charles GR-S-AC, and Institute GR-S-65 less uniform than either.

Based upon the above factors as well as an anticipation of the needs of this group, a series of experimental polymers has been or is being made for laboratory and factory evaluation.

A non-staining variation of GR-S-65, having similar low water absorption and a slightly faster rate of cure, has been prepared with the Naugatuck finishing process as X-362:

X-362: 71 butadiene-29 styrene, stabilized with UBUF (a salt of IBUL), 50 ± 5 Mooney, glue-acid coagulation (referred to in meeting as J-453).

A non-staining, low water absorption GR-S-60 for use in improving the processing characteristics (milling, calendering, and tubing) in blends with other non-staining GR-S types or natural rubber has been scheduled with Naugatuck finishing process as X-363:

X-363: 71 butadiene-28.5 styrene-0.5 divinylbenzene, stabilized with UBUF, 50 ± 8 Mooney, glue-acid coagulation, (referred to in meeting as J-454).

A preliminary report on X-363 indicates a higher Mooney than this objective and Williams' plasticity and recovery which correspond to other similar polymers. X-363 is also a low water absorption variation of X-344. It should be noted that dry polymers stabilized with UBUF will contain the same antioxidant as those stabilized with IBUL since the UBUF is reconverted to IBUL in the process. UBUF is being used in place of IBUL in several cases because of greater ease in handling.

In view of the present curtailment of production of dry polymer at Naugatuck, the Committee asked that the development of wire and cable GR-S be placed in a southern plant. Since production of GR-S-65 was recently transferred to Firestone-Port Neches (Tex.), two modifications of GR-S-65 have been scheduled at Port Neches as X-364 and X-365 in an attempt to obtain processing characteristics by changing polymerization conditions similar to those produced by the Naugatuck finishing line:

X-364: Same as GR-S-65 with 50 ± 5 Mooney except that it will be carried to lower conversion and be stabilized with 1.25 parts of phenylbetanaphthylamine (PBNA).

X-365: Same as X-364 except for a 60 ± 5 Mooney.

A very low water absorption GR-S comparable to deproteinized natural rubber has been prepared as X-361 by coagulating standard GR-S with a special alum process designed to keep water soluble material at a minimum. A preliminary report on water absorption of X-361 at 70° C. indicates 0.63-milligram per square centimeter after 24 hours and 2.24 mg/cm² after nine days. The Mooney viscosity is 60. This can be adjusted if the evaluation reports show a desire for improved processing characteristics.

An experimental pilot-plant non-staining type GR-S, PB-70202A9A, stabilized with antioxidant R-2015, is expected to have improved heat aging characteristics compared to GR-S-25 and better non-staining properties than GR-S-50. PB-70202A9A is available for sampling to the industry.

Samples of X-361 up to a limit of 200 pounds and PB-70202A9A in 10-pound lots may be obtained upon application to the chemical products division, Goodyear Tire & Rubber Co., Akron, O. No permit requests will be required, although a report on evaluation tests shall be made to Rubber Reserve as on all other experimental polymers.

Experimental lots of not over 75 pounds of X-364 and X-365 may be procured by application for purchase permits to the sales division of the Office of Rubber Reserve. Five-pound samples only of X-362 and X-363 will be available to those who have not previously obtained purchase permits. The production of the above polymers was made possible by the cooperation of this Committee and its visitors in

underwriting sufficient production to justify use of regular production facilities.

The Committee's attention is also directed to the fact that latex masterbatches of mineral pigments have been reported to result in better modulus, tensile, elongation, rebound, and slightly better tear resistance, when compared to mill mixing. The hardness remains about the same. Extrusion rates are faster, and processing, as measured by tubing index, is improved, although swell at the die is slightly greater. X-315 containing 50 parts Silene EF per 100 parts GR-S-25 is now available for evaluation. Masterbatches of this type are particularly desirable for pigments difficult to incorporate in mill or Banbury mixing. If other-type pigments are desired, an expression of that opinion should be forwarded to Rubber Reserve either through the Committee chairman or individually.

The industry might also find GR-S-16 (formerly X-272) of interest in specialty applications where a low water absorption and high-Mooney GR-S-10-type would be applicable. GR-S-16 has a rosin soap emulsification, 95-105 Mooney, glue-acid coagulation, and Stalite stabilization. This polymer could be of value alone or in blends with GR-S-50 or X-274 in providing increased body in uncured stocks, slightly higher tensiles with mineral pigments, and higher cured hardness. X-274 is a Stalite stabilized GR-S-10 at 55 to 65 Mooney. Both should reduce tendency of rosin soap polymers to stick to mill because of higher Mooney.

Rubber Reserve is establishing a standard reference lot of GR-S-65 to be designated as X-346 WC in an attempt to coordinate and improve test methods (water soluble ash, plasticity-recovery and water absorption) on polymers for wire and cable consumption. Ten-pound samples of X-346 may be obtained by application for sales permits to the sales division of Rubber Reserve after April 1, 1947.

New York Group Hears Larrick and Bogardus

SOME 300 members of the New York Rubber Group attended the spring meeting on April 11 at the ballroom of the Hotel McAlpin, New York, N. Y. Speakers at the technical meeting preceding the dinner were Lewis Larrick, director of the Department of Physics and Engineering, Institute of Textile Technology, who discussed "Fabrics for Mechanical Rubber Goods," and R. B. Bogardus, assistant manager of the plantations division, Goodyear Tire & Rubber Co., who spoke on "The Natural Rubber Recovery in the Far East." Before introducing the first speaker, Chairman Simon Collier announced that the Group's annual summer outing would be held on June 27 at Blasberg's Grove, Hawthorne, N. J. Entertainment during the dinner was provided by an old-fashioned "barbershop" quartet.

Fabrics for Mechanical Rubber Goods

Dr. Larrick began his talk with a discussion of the textile industry, which he said is unique in that it has no powder or liquid to pour and no continuous lengths of material to process. Instead, it deals with discontinuous macroscopic units of matter with lengths of about one inch and diameters of about 10 microns, a ratio of length of width of at least 1,000. These must be assembled, straightened, and made parallel, with as few as 10 and as many as 1,000 individual fibers in the cross-section of the yarn and delivered in continuous lengths as long as 1,000 yards.

Of the approximately 100 vegetable fibers, 15 animal fibers, and three mineral fibers comprising the commercially available natural fibers, four have assumed a dominant position: linen, wool, silk, and cotton, Dr. Larrick said. We think of linen fibers as being strong, crisp, and having a certain characteristic lack of elasticity. Wool fibers are characterized by springiness and high elastic recovery, but are weak in strength. Silk fibers are strong, flexible, and stretchy. We think of cotton fibers as being strong, rather stiff, and having only moderate elasticity.

These are only descriptive terms, and engineers require more precise definitions than these. Because of the essentially one dimensional nature of fibers and yarns, the measurement of strength in terms of p.s.i. is unsuitable, and the term tenacity is used, defined as the breaking strength per unit yarn number. The definition of stiffness is also of interest, and a measure of stiffness can be derived by using the slope of the tangent to the stress-strain curve at the origin. The measure of toughness is theoretically the area under the normal stress-strain curve. For practical purposes the break constant is used and defined as the product of the breaking stress and the breaking elongation. Elasticity can be delineated by using a stress value below which the material will recover from deformation. Associated with elasticity is resiliency, defined as the ratio of the area under the recovery part of the tensile stress-strain curve to the area under the loading part of the curve. Each fiber exhibits a maximum resilience which occurs at a different strain for each fiber. Nylon has a recovery power of 50% at 8% strain; silk has 30% recovery at 3% strain; high-tenacity viscose has 11% recovery at 14% strain; and cotton has 15% recovery at 4% strain.

Redefining the four dominant fibers in the light of their engineering properties, we find linen at the top of the strength scale, but very stiff and brittle. Cotton is fairly strong, somewhat stiff, rather tough, but more pliant than linen. Silk is weaker than cotton, but pliant and very tough. Wool is rather weak, very pliant, and tough, but not so tough as silk. In checking to see if a synthetic fiber has been tailor-made to combine the best properties of the four natural fibers, we find that the tenacity of flax or linen has been exceeded by nylon, glass, and saponified acetate; the pliability of wool has been exceeded by Vinyl E and high impact-strength acetate; and the toughness of silk has been exceeded by nylon and vinylidene chloride. However no one synthetic fiber is stronger than linen, more pliable than wool, and tougher than silk. There are many other questions such as dimensional stability, ease of dyeing, finishing, etc., which must be answered before the man-made fiber completely replaces the natural product.

In discussing the fibers available to the rubber industry, let us limit the discussion to those products employing textiles as the strength members embedded in rubber products which must withstand repeated stressing, flexing, and high temperatures, Dr. Larrick said. All the natural and synthetic fibers are available for use with rubber if economically justified and meeting the peculiar requirements of each application. The first such requirement is compatibility. Tires, belts, and hose, among others, are complex structures containing rubber, yarns, fabrics, and even steel wire. Since the fundamental engineering rule is that there must be no sharp stress concentrations, it is necessary to provide for adequate adhesion at the rubber-textile interface. Recent developments in synthetic fibers and in adhesives have emphasized that the adhesion must be studied for each combination of textile fiber and synthetic rubber, and that there is no universal adhesive for all products. This question of adhesion is also important to the textile man since he is blamed for many tire blowouts where failure actually started in the separation of the rubber from the cord.

A second important requirement of the rubber industry for its textile products is dimensional stability, but this problem rests largely with the rubber processor because the textile supplier has so little with which to work. A third requirement is elasticity, and this can be determined by subjecting the material to mechanical conditioning. One of the oldest and most common cries of the tire industry is for more strength in the fabric cords. This criterion is overrated as a review of tire history shows a continual decrease in the staple length of the cotton used (and therefore in cord strength) coupled with an increase in tire quality. As another example, cotton fiber is stronger than the high-tenacity rayon, yet the latter makes a better tire cord. The requirement of toughness and resiliency can best be determined by actual service tests of the rubber-textile product, rather than by textile laboratory methods. Finally, a peculiar requirement of the rubber industry for its textile products is heat resistance. Although heat deterioration is commonly measured by loss in tensile strength, there are indications that the two properties do not necessarily correlate.

Other requirements of the rubber industry also are not particularly understood by the textile manufacturers. One is the use of twist and the peculiar combinations of twist required by manufacturers of tire and belt cords. These requirements are inconsistent with obtaining maximum strength and indicate that other properties are involved in service use despite the cry for strength and more strength. There are similar inconsistencies in the stated requirements for other textile products used by the rubber industry. If the textile manufacturer understood the particular problems of the rubber man, he could probably construct a material more suitable for the application. Closer cooperation and mutual exchange of information between textile and rubber men are needed. In two other respects is close cooperation between the supplier and consumer necessary. The first is in standardizing methods of testing and tolerances, and the second is in standardizing specifications for mass production products. Specialty items should be specified only when there is definite need of departure from the standard.

Natural Rubber Recovery

Mr. Bogardus gave a survey of present-day conditions in the various Far Eastern rubber producing countries, after reviewing the origin and growth of the natural rubber producing industry. First discussing Malaya, the speaker stated that production there now exceeds 50,000 tons monthly, despite labor unrest and economic difficulties. Production is estimated at about 90% of capacity, although it is recognized that the trees are temporarily yielding "flush" yields, resulting from de-

creased production during the Japanese occupation.

In the Netherlands India, potentially the most important rubber producing area in the Far East, production has been seriously impeded by political unrest and it has not been possible for plantation owners to operate or even visit their estates. Some properties are being operated by natives, and the rubber smuggled to Malaya for sale. Under existing conditions rubber production in the Indies is not expected to exceed 30,000 tons per month, and prospects for improvement in the foreseeable future are not bright. This rate of production amounts to about 40% of capacity, and it may be another year or more before conditions return to their prewar state.

French Indo-China is capable of producing about 100,000 tons of rubber a year, although current production is at a rate not much greater than 30,000 tons annually because of political unrest. Future prospects are not bright, pending settlement of differences between the natives and the French. In British North Borneo and Sarawak, prewar production capacity was about 65,000 tons annually, but current production is about 45,000 tons annually, or approximately 70% of capacity. Siam has a capacity of about 60,000 tons a year, and current production is about 75% of capacity, with practically all the rubber being marketed in Malaya. India and Burma are relatively small producers, but in prewar days gave about 20,000 and 15,000 tons, respectively, per annum. Practically all the India production is retained for local consumption. Ceylon has a production capacity of about 100,000 tons a year and was the chief source of supply during the war. Current production is suffering badly from the forcing of production during the war and will probably not exceed 75,000 tons this year. Because of low-yield trees and consequent high costs, only a small proportion of Ceylon rubber would be produced if price levels should decline in the future. Production in the Philippines is only about 25,000 tons per annum, but is now in excess of this figure because of flush yields. In total, the Far East is now producing about 65% of prewar production, with the future rate of increase expected to be slow because of political and economic difficulties.

Regarding the liquid latex situation, Malaya and the Netherlands India were the principal suppliers before the war, the former shipping about 22,000 tons per annum and the latter about 17,000 tons. At present Netherlands India is out of the picture, with installations destroyed and the condition of equipment unknown. A year will probably be needed to reinstall equipment after the pantations have been restored to their former managements. Malayan latex operations are progressing and expanding, and it is expected that some 15,000 tons will be shipped to the United States this year. The only other sizable source for latex is Liberia, which can be expected to ship about 10,000 tons this year. Accordingly, the available supply to this country may well be only 25,000 tons in 1947, which amounts to about half the requirements, based on RMA estimated demand of about 50,000 tons at present prices. Handling and shipping facilities for latex are being expanded, and some authorities foresee a monthly latex consumption of 10,000 tons within the next few years, provided ample supplies are available at normally low costs.

Cake and Tuley before R. I. Rubber Club

WITH an attendance of 124 members and guests, the Rhode Island Rubber Club had one of its most successful meetings at the Crown Hotel in Providence, R. I., on April 10. Following a steak dinner supplemented by musical entertainment, Chairman H. W. Greenup announced that the scheduled speakers were both unable to attend. Ludwig Meuser, Naugatuck Chemical Division, United States Rubber Co., who was to have spoken on "Development of the Naugatuck Chemicals," was on his way to attend a symposium on high polymers at Heidelberg, Germany. J. W. Bicknell, plantations division, U. S. Rubber, who was to have spoken on "Postwar Conditions in Natural Rubber Producing Areas," was taken ill on the previous day. W. E. Cake, also plantations division, U. S. Rubber, appeared for Mr. Bicknell, and W. F. Tuley, also of Naugatuck Chemical, spoke in place of Dr. Meuser.

Dr. Cake in his talk first stated that in the prewar year 1941, about 90% of the world's supply of natural rubber was produced in countries later occupied by the Japanese and that chief among these were British Malaya, Netherlands India, Indo-China, Siam, and Burma. The remaining 10% was produced in Ceylon, Liberia, South and Central America, etc. The speaker sketched briefly the present status of economic and political conditions, as well as current and prospective rubber production of the major prewar producers, starting with British Malaya. Here the 1941 output was 600,000 long tons. In 1946 the output dropped to 380,000 tons. The estimate for 1947 from this source is 600,000 tons, the same as prewar, and it was further estimated that 600,000 tons would also be produced in 1948. Present yields at the prewar rate, despite the destruction of about 7% of the rubber areas during the war and despite the labor shortage, were accounted for by increases in the yields per tree now being obtained because of the four-year period during which almost no tapping was conducted. These flush yields are expected to taper off, fairly rapidly at first, although it may be six years before the drop to normal levels is reached.

The comparatively rapid postwar resumption of rubber production in Malaya was facilitated by the early entry of British occupation forces after the Japanese capitulation and the almost simultaneous return of estate personnel under the auspices of the Malayan Rubber Estates Owners Co.

Estates, equipment and buildings in Malaya suffered considerable depredation during the Japanese occupation. To serve as an illustration of the cost of rehabilitating these rubber plantations, the speaker mentioned that an estimated expenditure of $3,850,000 would be required to return the 26,600 acres of rubber remaining on the estates of the Malayan American Plantation, Ltd., to their former condition of upkeep and usefulness. This total is split up into approximately $1,336,000 for clearing the undergrowth and repairing buildings roads, bridges, drains, etc., and about $2,514,00 to replace equipment either removed or destroyed; the field rehabilitation will take three years; while it is hoped that the processing equipment can be reconstituted over a two-year period.

In the Netherlands India, the 1941 production amounted to 650,000 tons. Only 170,000 tons were produced here in 1946. Assuming conditions remain substantially unchanged during the next six months or so, a yield of 300,000 tons is expected in 1947. An estimate of 550,000 tons for 1948 was based on a hoped-for development of a more stable government and improved economic conditions. If improved political conditions materialize, a survey of rubber plantation areas on the East coast of Sumatra is tentatively scheduled for June/July, provided adequate police protection is meantime arranged.

The production from Indo-China in 1941 amounted to 75,000 tons. Only 20,000 tons were produced in 1946; while estimates for 1947 and 1948 are 35,000 and 90,000 tons, respectively. The low estimates for 1947 are the result of: (1) very serious labor shortage, (2) political insecurity, (3) shortage of supplies and shipping, and (4) the present economic inflation caused by a serious shortage of consumer goods, Dr. Cake stated.

Ceylon, the chief rubber producing area not falling into enemy hands during the war, produced 99,500 tons of rubber during 1941 and 90,000 tons in 1946. Estimates for 1947 are 80,000 tons, and 70,000 tons for 1948. Two factors were mentioned in support of the projected decline in production. Ceylon is currently in the throes of social experiments which will mean reduced production until the situation becomes more stabilized. Drastic tapping methods were practiced in Ceylon during the war years in order to secure the maximum amount of rubber; now that the emergency is removed, estate owners are resuming more moderate systems of tapping, which, of course, tend toward lower yields.

In conclusion, Dr. Cake gave the following previous actual and estimated future totals for natural rubber output throughout the world.

Year	Long Tons
1941 actual	1,595,500
1946 actual	800,000
1947 estimated	1,200,000
1948 estimated	1,504,000

The speaker's estimates for imports of natural rubber latex into the United States during 1947 and 1948 follow:

	In Long Tons Dry Weight	
Latex	1947	1948
Normal	1,548	....
Centrifuged	14,650	20,539
Creamed	6,474	15,658
Totals	22,672	36,197

These latex figures are based on the expected output of the four major producers, three in Malaya and one in Liberia. For this reason the estimates should be regarded as minima since other producers may be expected to ship certain quantities into the United States, particularly during 1948, Dr. Cake added. An early return of estate personnel to the plantations on the East Coast of Sumatra might also be expected to augment the estimate for 1948.

Dr. Tuley, speaking on the manufacture of rubber chemicals in general and by the Naugatuck Chemical Division of U. S. Rubber in particular, first pointed out that in 1939 there were 63 plants manufacturing chemicals in New England employing 26,000 people and doing $162,000,000 worth of business. During the war years $31,000,000 was spent in improvements and additions to these plants, which should result in a considerable expansion of production and business in the future, he added.

This speaker then gave a brief history of the Naugatuck Chemical Division and followed this account with a summary of the products now made by this division. These included inorganic chemicals, rubber chemicals, reclaimed rubber, dispersions of both reclaimed and natural and synthetic rubbers, processed and compounded latices, aromatics, agricultural chemicals, plastics, and synthetic rubber.

Dr. Tuley concluded his talk by making a plea for the continuation of the synthetic rubber industry in the United States for the purpose of insuring national security, maintaining a greater degree of price stability of natural rubber, and because in the manufacture of many rubber products, synthetic rubbers provide end-product quality superior to that obtained with natural rubber.

Rubber in Automotive Industry

THE Buffalo Rubber Group and the Ontario Rubber Section held a joint dinner meeting, the first since the beginning of the war, on April 22 at the General Brock Hotel, Niagara Falls, Ont., Canada. Speaker of the evening was Robert K. Williams, of the General Motors Corp. research laboratories, who discussed "Rubber in the Automotive Industry." Harry Outcault, vice chairman of the Division of Rubber Chemistry, American Chemical Society, spoke briefly on the relation of the various groups to the Division, urging closer cooperation between the groups.

Mr. Williams stated that 70 to 80% of the total rubber used goes into the automotive industry, with 70% of this rubber being used in the tires. A 3,300-pound car, has about 440 rubber parts weighing 175 pounds. The importance of these rubber parts to passenger comfort and safety is out of all proportion to their weight percentage, the speaker noted. For example, the hydraulic brake is dependent upon rubber parts for its operation, and all joints in the front suspension and steering systems are protected by means of rubber seals. Many of the new automotive developments depend on rubber for their utility. Automatic and semi-automatic transmissions are made cheaper and better through use of oil-resisting rubber cups and packings for sealing the pistons. These applications are unusually severe, involving continuous operation in fluids at a temperature of 250 to 300° F., and require the utmost heat and oil resistance of present synthetic rubbers.

Specifications for the various rubber automotive parts have been greatly improved through the joint efforts of S.A.E. and A.S.T.M. committees who have established classified tables containing identification numbers and physical properties of virtually every conceivable rubber compound that would be used in the automotive and mechanical goods industries. These tables have been found very useful, as in the case of specifying rubber compounds for automotive grommets which require high tensile strength, high resistance to tear, abrasion, and cut-growth, and low compression set. Special properties, such as non-staining qualities required in applications involving contact of the rubber with painted or lacquered surfaces, are handled by the use of suffixes to the identification number.

Special part specifications are used for the more critical applications, such as hose, brake cups, motor mounts, rotating shaft seals, and others. These critical applications generally involve the assembly of rubber to metal or fabric to give a product whose failure would cause a serious breakdown of the vehicle. Mr. Williams concluded his talk by pointing out the difficulties encountered in service and the problems involved in attempting to write specifications to meet these special requirements. In some of these applications the present rubber compounds being used are not entirely satisfactory and further development and research are needed to provide adequate materials.

Officers of the Ontario Rubber Section for the 1947-48 season were announced, as follows: chairman, J. P. Hooper, of H. L. Blachford, Ltd.; secretary-treasurer, D. K. Walker, of Dunlop Tire & Rubber Goods Co., Ltd.; and members of the executive committee, M. C. Bartlett, of Canada Wire & Cable Co., Ltd., G. Baxter, of Firestone Tire & Rubber Co., of Canada, Ltd., and H. K. Cunliffe, of Dominion Rubber Co., Ltd.

Fageol Discusses Rubber Suspension Systems

A PAPER on "A Rubber Torsilastic Suspension System" was presented by F. R. Fageol, board chairman of the Twin Coach Co., before the SAE National Transportation Meting, held at the Stevens Hotel, Chicago, Ill., April 16 to 18.

Rubber is satisfactory for use in springs because of the following reasons, Mr. Fageol stated: (1) it is perhaps the most flexible, elastic, mobile, and inert material known for practical use; (2) it has substantially no initial friction to overcome in flowing or flexing; (3) it is forever silent under flexing or movement; (4) in flowing or flexing within itself, it never wears and will last almost forever if the motion is held within its well-known elastic limits; (5) it requires no lubrication or care; (6) it is resistant to salt, grit, grease, and all of the things to which a vehicle spring is exposed; and (7) it has the ability to absorb shocks ranging from the most minute to the most intense. These properties are needed in the springing of vehicles in order to provide maximum passenger comfort, maximum protection from shock of the vehicle, and maximum of trouble-free life and the minimum of maintenance cost.

Besides tension and compression, a usual application of rubber is in shear. In customary use the problem is to keep the stresses low at the end of the shear plates. This action is accomplished by wrapping the rubber in a circle and joining the ends. By this method high end stresses are eliminated, and higher unit stresses allowed for a given amount of rubber. Thus a cylindrical shear rubber unit seems to be the best form.

In practical use, there are two general methods of applying a suspension to the body structure or chassis of the vehicles in use today. One of these, and also the most usual, is to let the springing member act as the radius rod or locating device for the axle, as is best exemplified by the conventional leaf spring. The other method is to use a rigid mechanical system to support the axle or wheels and to utilize a springing member, which also serves to support the load. This method is best exemplified by knee action, as used in many passenger cars. A basic study of the application of the shear rubber unit, considering all factors of cost, manufacture, and servicing, indicates that it is best used as the locating means for the axle, as well as the springing member.

The method of suspending the body by rubber shackles from the lever arms gives a certain amount of lateral cushioning, which divorces direct load shock from the body, and also by the nature of the geometry involved permits the body to tilt slightly inward on a curve, as opposed to conventional systems which have an opposite effect. The use of rubber in the shackles themselves provides an appreciable amount of fore and aft cushioning which means, in the case of a severe shock, the axles can actually float slightly, dissipating the shock load. The design of the geometry and the foreshortening action of the lever provide a substantially uniform spring deflection under any load condition, which in practical terms means that a bus will ride the same whether it has one or one hundred passengers. Rubber shackles also eliminate direct mechanical contact of the wheels to the body, by means of three-point rubber suspension, and cut out any direct severe shock loading in the body. In addition, because of the stable properties of the rubber and the system, the ride will not change with age, unlike the conventional leaf spring system which stiffens with age owing to building up of initial friction between the leaves.

The system cannot squeak or rattle. Among tests run by the B. F. Goodrich Co., were a series of oscillation tests of ten million cycles each. No main springs have shown any indication of failure in these tests. While in some tests the rubber in the shackles began to show fatigue by cracking or opening up at the end of six million cylces, they did not fail completely at the end of the test, showing that there is no danger of sudden failure as might happen with a conventional steel spring system. Thus, by use of rubber, a suspension system has been achieved that has a low noise level, is clean, relatively light in weight, and simple in design.

Naugatuck GR-S-SP Polymers

IN RESPONSE to a concerted appeal from the wire and cable industry, the Office of Rubber Reserve will produce at the Naugatuck GR-S plant a series of GR-S-SP synthetic rubbers beginning May 1. The SP suffix has been added to indicate the superior processing qualities of the Naugatuck elastomers. Announced April 18, the program calls for Rubber Reserve to make available GR-S-SP, GR-S-SP-65, and GR-S-SP-60 for shipment against May permits. These synthetic rubbers will be GR-S, GR-S-65, and GR-S-60 produced through the Naugatuck finishing lines. It is proposed that a selling price be fixed at 19.25¢ per pound, plus the applicable uniform freight charge.

Other polymers, such as X-362-GR-S-SP (formerly X-362, selling at 18.5¢ per pound, plus freight) and X-278-GR-S-SP (formerly X-278, selling at 19¢ per pound, plus freight), will be made available if a substantial quantity of the polymers is requested. As to these polymers, it is proposed that selling prices be fixed at 19.25¢ and 19.75¢ per pound, respectively, plus uniform freight charge.

It is necessary to increase the price of all Naugatuck dry synthetic rubber to compensate for the higher production costs of these grades of rubber at Naugatuck as compared with production costs for standard grades at other locations. Rubber Reserve will manufacture the GR-S-SP rubbers in quantities large enough to satisfy the demand, originating almost

entirely from the wire and cable trade. Because of volume considerations, it is essential that the demand for the Naugatuck rubber remain at the high projected level and at a steady level, in order that anticipated production costs may be realized. Any rearrangement of the demand will have certain economic consequences that cannot be overlooked by O.R.R.

It is urged that requests for May delivery of the GR-S-SP synthetic rubbers be submitted to Rubber Reserve as soon as possible so that the production pattern at Naugatuck can be determined.

1946-47 Mellon Institute Report

A REVIEW of the 1946-47 research activities and accomplishments of the Mellon Institute of Industrial Research, Pittsburgh 13, Pa., based on the thirty-fourth annual report of Director E. R. Weidlein to the board of trustees, reveals that the departments and fellowships of the Institute have generally completed the transition from wartime programs to the basic long-range projects that constitute the organization's normal functions. Seven fellowships were commenced during the year, including one on plastics working. Ten other fellowships interrupted during the war, including those on carbon black, new plastics, and pine chemicals, will enter upon work as soon as personnel and facilities become available. Six programs were completed during the year, including those on calcite technology and rayon chemistry. The Institute's expenditures for pure and applied research totaled $2,697,982 for the fiscal year March 1, 1946, to March 1, 1947.

Bentonite clay has been utilized by a multiple fellowship of the National Lead Co. in the compounding of plastics as a cooperative extender, rather than as an inert filler. This use has been brought about by the chemical reaction between bentonite and resin-forming organic polymers in such a manner that the resultant product might be regarded as a copolymer of resin and mineral. One result of the method has been to eliminate the interface between the organic binder and mineral filler. Compression molded pieces containing this material have shown low water absorption, high resistance to chemical attack, good electrical properties, and resistance to distortion at elevated temperatures. Pilot-scale production of one type of compression molding plastic has been carried on over the past year.

On the multiple fellowship of the International Nickel Co., nickel compounds are being synthesized and studied as part of a basic program to explore the chemistry of nickel, from both fundamental and applied viewpoints. The work is being directed toward subjects of industrial interest, such as pigments, fungicides, and additives for special functions in petroleum and rubber chemistry.

Studies of the chemical correlation of crude oils and bituminous materials have been extended by the multiple fellowship of the Gulf Research & Development Co. New and more precise methods of separation and new correlations of physical properties have enabled better comparisons and more reliable conclusions on geochemical relations. Basic work on separation processes has been continued, especially in the field of distillation. The controlled polymerization of selected olefins to specific isomers has been accomplished, and progress has been made in determining the constitution of new types of sulfur compounds derived from olefins. Advancement has been made in controlling plant operations in the synthesis of alkylated phenols. A new class of antioxidants has been developed. The program of fundamental research on the mechanism of catalytic petroleum reactions has been fruitful, and the work with the radio-active carbon isotope on the mechanism of the Fischer-Tropsch synthesis has been especially productive.

The multiple fellowship of the Texas Gulf Sulphur Co. has published research on the structure of ethylene polysulfides, on the sulfurization of unsaturated compounds, and on resinous products from petroleum polymer sulfurization.

The Carbide & Carbon Chemicals Corp.'s multiple fellowship resumed the task of developing new chemicals and processes for industry. Developments included hydraulic brake fluids of different types, and the utilization of Flexol Plasticizer B-400 to replace castor oil in formulations for the cloth-coating industry. A detailed investigation was made of the basic factors governing the formulation of Vinylite resin dispersions. Other accomplishments included an improved softener and flame retardant for paper treating, water-soluble waxes for use as binders and thickeners in textile sizes, and non-ionic surface-active agents for solubilizing oils and waxes.

The multiple fellowship on catalysis, initiated in 1944 by the Rubber Reserve Co., curtailed its investigations on the butadiene-from-alcohol process early in 1946 and was assigned a program on control by instruments of the commercial production of synthetic rubber. The new project aims at eventual instrumentation of the GR-S process, the main endeavor being devoted to the continuous process, and gratifying progress has been made.

The Firestone Tire & Rubber Co.'s multiple fellowship has been concerned for a number of years with the study of the chlorinated products from commercial synthetic rubber and, more especially, from synthetic rubbers made specifically for chlorination. The ultimate goal has been the achievement of a product of great stability. A result of this program is a new type of chlorinated rubber characterized chiefly by its flexibility and toughness, as compared with ordinary commercial chlorinated rubber.

The multiple fellowship sustained by the Corning Glass Works, in cooperation with the Dow Corning Corp., has kept on investigating both the fundamental chemistry and the practical applications of organosilicon compounds. The ionic nature of the Si-O bond has been found to be responsible for many of the reactions peculiar to organosilicon chemistry.

Atomic Power Exhibit

BENEFITS arising from research and development of atomic power to industry and our daily life will be depicted in an exhibit, "The Atom in Peacetime," which will be the keynote feature of the Mid-America Exposition of 1947, to be held in the Public Auditorium, Cleveland, O., from May 22 to 31, during which time the Division of Rubber Chemistry, American Chemical Society, will be meeting at the Hotel Cleveland.

With the guidance and cooperation of the Atomic Energy Commission, this atomic power exhibit will be the first comprehensive display of scientific, engineering, and industrial developments in the field of commercial atomic power applications. The display is being prepared by a group committee including representatives of the Kellex Corp., the Mid-America Exposition, Inc., J. R. Dunning, of Columbia University, and the Atomic Energy Commission. The Kellex Corp., a division of M. W. Kellogg Co., developed and engineered the K-25 plant at Oak Ridge, Tenn., principal source of Uranium 235 for the atom bomb, and is currently engaged in the program of peacetime applications of atomic power.

Plans for the exhibit are now under way, and details will be announced at a later date. It was stated, however, that display units officially scheduled for the project will include such basic divisions as power, radio-active isotopes, collateral industrial benefits, and public safety.

In describing the aims of the exhibit, A. L. Baker, vice president in charge of the Kellex Corp., stated that, "While we cannot reveal our exhibit plans at this time, the display will tend to show that atomic power plants are far closer to practical reality as regards initial and maintenance costs than is generally supposed. Comparing power costs per kilowatt by atomic power with costs per kilowatt by standard energy sources, we can say that costs by the new method would not be greatly out of range."

Receives Research Institute Medal

CHARLES A. THOMAS, vice president and technical director of Monsanto Chemical Co. and one of the key figures in the development of atomic energy, has been awarded the 1947 Industrial Research Institute Medal, presented for outstanding contributions to the field of industrial research. The Institute, composed of 88 companies representing diversified types of industries throughout the nation, cited Dr. Thomas for his "contributions to the administration and management of industrial research." The medal will be presented during the annual meeting of the Institute at Swampscott, Mass., on June 5.

Dr. Thomas, one of a group of scientists to receive the Medal of Merit from Secretary of War Robert P. Patterson in March, 1946, was also one of five co-authors of "A Report on the International Control of Atomic Energy," prepared for the Secretary of State's Committee on Atomic Energy. He is director of the Clinton Laboratories at Oak Ridge, Tenn., and president-elect of the American Chemical Society.

Use of Pine Tar and Pine-Tar Oil

STATISTICS have recently been released by the United States Bureau of the Census on the wartime uses and allocations of pine tar and pine-tar oil of all grades. For the period from July 1, 1944, to June 30, 1945, 4,825,000 gallons of the tar and oil were allocated, of which 2,270,000 gallons, or 47% were used in rubber compounding, and 933,000 gallons, or 19.3% were used in rubber reclaiming. From July 1 to December 31, 1944, 1,058,000 gallons were used in rubber compounding, and 487,000 gallons in rubber reclaiming, while from January 1 to June 30, 1945, 1,212,000 gallons were used in rubber compounding, and 446,000 gallons were used in rubber reclaiming.

Plastics Technology

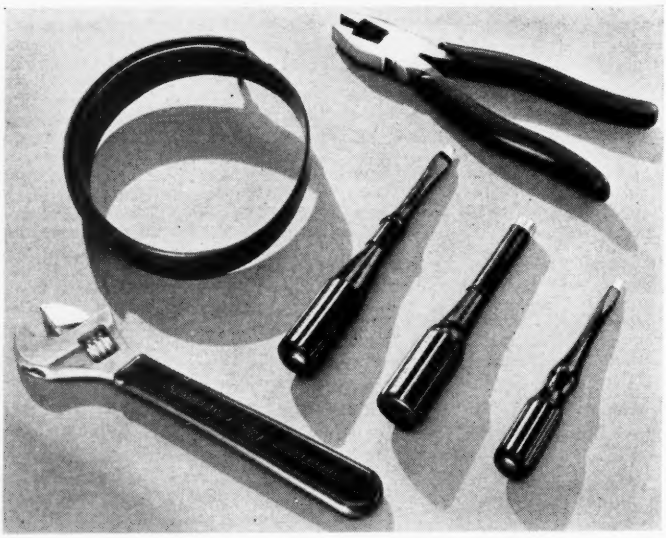


Fig. 1. Tool Handle and Deicer Boot Formulated With Phenolic Resin and Nitrile Rubber

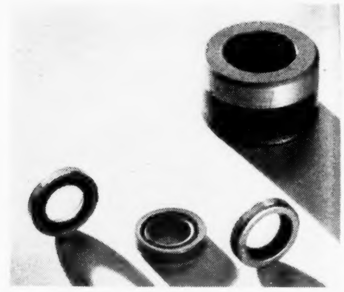


Fig. 2. Oil Burner Clutch and Oil Seals Employing Phenolic Resin and Nitrile Rubber in Combination

Phenolic Resins Improve Synthetic Rubber Goods

C. R. Simmons[1]

TWO years have elapsed since phenolic resins were first introduced as compounding agents in the production of hard and semi-hard synthetic rubber stocks. During this period further testing and experimentation, combined with large-volume production experience by many rubber products manufacturers, have definitely established the advantages which may be gained through the use of these resins.

It may be recalled that the addition of various percentages of a phenolic resin to certain synthetic stocks softens or plasticizes them to a point where they are easily handed on the mill. In addition a number of physical properties of the rubber, when cured, are noticeably improved. In cost cases standard processing procedures for the specific copolymer being processed may be followed, as the resin melts and disperses readily on the mill or in the Banbury mixer.

Beneficial properties contributed by the resins include increased oil and heat resistance (inherent properties of the cured resin), improved finish with greater resistance to weathering, less surface checking, and increased tensile strength, hardness, and abrasion resistance.

The photographs show several typical applications in which rubber-resin combinations have been utilized. In the Cohardite insulated tool handle covers, manufactured by the Connecticut Hard Rubber Co., a Hycar-Durez resin combination is now being used in production. (See Figure 1.) Improved surface finish, increased stiffness and hardness, and better adhesion of the cover to the metal handles are dividends gained in the finished product through the use of the resin. The improved rubber-to-metal adhesion contributed by the resin, as noted above, occurs with almost all metals.

The deicer boot, in Figure 1, is also manufactured by Connecticut Hard Rubber from a Hycar-Durez combination. The piece includes a cloth insert and a bonded metal tube. It is claimed that in terms of durometer hardness, flexibility, and adhesion, the resin was of material aid in meeting a difficult specification. The boot is used in a propeller assembly whereby deicing fluid is sprayed over the blades.

From the Graton & Knight Co. come two other examples of the use of resin with nitrile type synthetic rubber. The large part in Figure 2 is a resilient coupling used in the new Gilbert & Barker Mfg. Co. oil burner, "Economy Clutch." Graton & Knight found that the greatest possible adhesion between the metal members and the rubber was obtained by incorporating Durez resin in a Perbunan rubber. Adhesive strength in the finished part is extremely high. The clutch on the Gilbert & Barker oil burner is a radically new development. The improved properties of the rubber-resin part and the stronger bond between rubber and metal provide added safety factors for this resilient coupling.

An application of the phenolic resins closely related to their actual incorporation in a rubber formulation is in cements for rubber. Exemplary of this are the oil seals in Figure 2 supplied to the Warner gear division of Borg-Warner Corp., by Graton & Knight. A cement composed of two Durez resins in a methyl alcohol-methyl ethyl ketone solution was found to be the most effective method of bonding the sulfurless rubber to the metal case.

While most of these applications have to do with the acrylonitrile-butadiene copolymers and a Durez resin especially designed for this type, other resins are available for use with the styrene-butadiene copolymers (GR-S), and with neoprene (GR-M). One of these plasticizes GR-S during processing and, when cured during molding, contributes strongly to hardness. Tear and abrasion resistance are also improved. The resin contributes stiffness to cured stocks, which is particularly desirable in shoe sole formulations.

[1] Durez Plastics & Chemicals, Inc., North Tonawanda, N. Y.

A.S.T.M. Plastics Committee

WHILE the main feature of the meeting of A.S.T.M. Committee D-20 on Plastics, held in Cincinnati, O., early in March, was a technical symposium, there was also evidence of intensive activity in many phases of the work involving standardization and research. Two new tentative methods completed by Subcommittee I on Strength Properties were approved. The first method covers two procedures for determining the bearing strength of rigid plastics in either sheet, plate, or molded forms, and the second method covers a test for bond or ply adhesion strength of sheet plastic and electrical insulating materials. Revisions were also submitted on the impact test and on the test for stiffness in flexure of non-rigid plastics.

The subcommittee on hardness properties reported plans for a round-robin test program in 12 laboratories to study the Taber abraser for testing the abrasion or scratch resistance of plastics. Various optical methods are also being studied to determine the percentage of scattered light after various abrasion cycles.

A new tentative method of test for mobility of thermosetting resins was submitted by the subcommittee on thermal properties. Revisions were also accepted on the test methods for heat distortion temperature of plastics and for measuring the flow properties of thermoplastics.

The subcommittee on optical properties presented a progress report on studies of test methods for percentage of light transmittance, improved methods for measuring haze, and methods for determining optical distortion.

A new tentative method for determining weight loss of plastics on heating was submitted by the subcommittee on permanence properties. Studies are being made on the effect of water on plastics, particularly the variables that affect the moisture vapor transmission. A procedure for measuring shrinkage is also in preparation.

At the organization meeting of a new section on specifications for plasticizers, consideration was given to results of a

questionnaire on what properties should be covered by such specifications. The consensus favored acidity, purity, specific gravity, and color as essential requirements. Twelve additional requirements were suggested, some of which will have merit for specific plasticizers or applications. Revisions were made in the tentative specifications for cellulose acetate and cellulose acetate butyrate molding compounds to provide requirements for flow temperatures.

The subcommittee on analytical methods reported that work is being undertaken on the development of a method of test for plasticizers. The subcommittee is also studying methods for the determination of plasticizer, residual solvent, pigment, and filler in cellulose ester plastics. Consideration is also being given to the need of undertaking work on test methods for viscosity and molecular weight of polymeric materials used in plastics, methods for aging and identification of plastics, and methods for studying the effect of reinforcing pigments on plastics.

The Society is planning to publish the symposium on plastics, covering the papers and discussion presented at the meeting. It is hoped that this can be available during the early summer.

Grebe Receives Hyatt Award

JOHN J. GREBE, director of Dow Chemical Co.'s physical research laboratory at Midland, Mich., received the John Wesley Hyatt Award on April 23 for outstanding achievement in the plastics industry during 1946, and, in particular, for his work in the production of pure styrene and its polymerization. At the same time Robert R. Dreisbach, also of Dow's physical research laboratory, was presented with a silver medal for his contributions to the development of styrene. Dr. Grebe received his award, consisting of a gold medal and $1,000, at ceremonies following a dinner given in the Hotel Statler, Detroit, Mich., with more than 70 persons attending. Charles K. Kettering, vice president of General Motors Corp. and a member of the Hyatt Award Committee, made the presentation. Richard F. Bach, dean of education and extension of the New York Metropolitan Museum of Art, served as toastmaster, and Walter D. Teague, industrial designer and political author, spoke on "Design in the World Today."

After receiving a master's degree from the Case School of Applied Science, Dr. Grebe joined Dow Chemical and has since then conducted research in many fields, including the production by means of high temperatures of butadiene, synthetic rubber, high-frequency electrical insulation, and other chemical products. He and his associates did much of the major research work in this country on the production of pure styrene used during the war and afterward in making synthetic rubber and polymerized styrene. Dr. Grebe was awarded the Chemical Industry Medal for 1943 for his work in solving some of the problems connected with the automatic control of chemical reactions.

Mr. Dreisbach became associated with Dow Chemical after his graduation from Western Reserve University in 1913. In 1932 he joined the staff of the physical research laboratory under Dr. Grebe. Some 48 patents have been issued to Mr. Dreisbach and his associates, of which 26 specifically relate to plastics and cover the manufacture of styrene and styrene derivatives, inhibiters for styrene polymerization, polymers and copolymers of styrene, and more recently, synthetic rubber. Two of the basic patents now used to produce the greater part of styrene manufactured in this country are in Mr. Dreisbach's name. One covers the use of superheated steam to supply the heat of pyrolysis for converting ethylbenzene to styrene. The second, granted to Mr. Dreisbach and James E. Pierce, covers the use of sulfur in the column during distillation of styrene monomer.

Silicone Plastics Finishes

FIVE years hence motorists will not need polishing waxes for their automobiles because they will be finished in a new type of silicone plastic, according to A. E. Byrne, manager of the chemical division of Canadian General Electric Co., Ltd., who recently spoke before a meeting of the Royal Canadian Institute at Toronto, Ont. With the use of a new type of finish or varnish, Mr. Byrne said, the surface will be so hard, shiny, durable, and weather resistant that a damp cloth will fix it. The speaker also stated that low-pressure laminates would be used in baby carriages, boats, and even car bodies. Mr. Byrne also reviewed other silicone developments including silicone rubber, and stated that many of the plastics now entering production will improve almost every aspect of our life in the near future.

CALENDAR

May 6.	**Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.**
May 8.	**Quebec Rubber & Plastics Group.**
May 9.	**Akron Rubber Group.**
May 9.	**Chicago Rubber Group. Hotel Morrison, Chicago, Ill.**
May 9.	**Connecticut Rubber Group. United Illuminating Co. Auditorium, New Haven, Conn.**
May 16.	**Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.**
May 16.	**Philadelphia Rubber Group. Kuglers Restaurant, Philadelphia, Pa.**
May 24.	**Southern Ohio Rubber Group. Outing.**
May 26-28.	**Division of Rubber Chemistry, A.C.S. Spring Meeting. Hotel Cleveland, Cleveland, O.**
June 1-6.	**SAE. Summer Meeting. French Lick Springs Hotel, French Lick, Ind.**
June 1- July 31.	**United States Treasury Department. BOND-A-MONTH PLAN Campaign.**
June 3.	**Los Angeles Rubber Group, Inc.**
June 8-10.	**Chemical Institute of Canada. Banff Springs Hotel, Banff, Alta., Canada.**
June 12.	**Quebec Rubber & Plastics Group.**
June 15-19.	**ASME. Semi-Annual Meeting. Stevens Hotel, Chicago, Ill.**
June 16-20.	**A.S.T.M. Fiftieth Annual Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J.**
June 27.	**New York Rubber Group. Annual Outing. Blasberg's Grove, Hawthorne, N. J.**
Sept. 1-4.	**ASME. Fall Meeting. Hotel Utah, Salt Lake City, Utah.**

Film on Plastics Molding

THE story of completely automatic plastics molding is told in new 30-minute color and sound motion picture, "Robots at Work," produced for the F. J. Stokes Machine Co. by Hathen Productions, Inc., Philadelphia 3, Pa. Various methods of compression molding of thermosetting plastics, and action shots of hand presses, simple hydraulic presses, and semi-automatic presses are shown with the advantages and disadvantages of each. The latest development in plastics molding, the completely automatic molding machine, is then shown. Two models of these machines, the 15- and 50-ton Stokes presses, are described in detail.

The film is available free of charge for showings before engineering and manufacturing associations and industrial plant groups. Requests should be made on company or association letterheads.

Rubber and Plastics Program

THE Rubber and Plastics Division of the American Society of Mechanical Engineers will have one technical session as a part of the semi-annual meeting of the parent society, to be held at the Hotel Stevens in Chicago, Ill., June 15 through 19. This session will be held on Thursday afternoon, June 19, and three papers will be presented: "Motor Mount Testing Machine," by Lloyd E. Muller, Buick division, General Motors Corp., Flint, Mich.; "Factors Affecting Performance of Aircraft Hydraulic Packings," L. E. Cheyney and T. J. McCusition, Battelle Memorial Institute, Columbus, O.; and "Some Properties and Mechanical Applications of Compar," J. J. Hrrov, Resistoflex Corp., Belleville, N. J. Henry M. Richardson, DeBell & Richardson, Springfield, Mass., chairman of the Division, will preside.

New Tackifier

MODICOL G, a new synthetic tackifier for neoprene and Butyl rubbers, is now on the market. The product, an anhydrous resinous material, is said to be particularly useful in the formulation of friction compounds; as little as 2% on the weight of the rubber produces an excellent bond between the fabric and rubber. Modicol G can be used either alone or in combination with other tackifiers.

Wartime Use of Dipentene

INFORMATION on allocations of dipentene for the period July 1 to December 31, 1944, recently was released by the United States Bureau of the Census. Of a total of 1,510,000 gallons allocated during this period, 1,074,000 gallons or 71.1%, went into rubber processing, and 25,000 gallons, or 1.7%, were used in synthetic resins. For purposes of control, dipentene was defined to comprise terpene solvents having a distilling range of solvent power above that of turpentine. Natural and synthetic material of all grades are included in the statistics.

RUBBER WORLD

NEWS of the MONTH

Highlights—

An Army-Navy Munitions Board Rubber Industry Advisory Committee was formed during April, composed of 31 leaders of all branches of the rubber industry. This committee will aid in the development of industrial mobilization plans and advise regarding the strategic stockpiling of natural rubber. Trading in natural rubber was resumed on April 1, and the futures market began operations again for the first time in five years at the Commodity Exchange in New York on May 1. Rubber Order R-1 of the CPA was revised on April 18 and on May 1 to permit the maximum use of available natural rubber. The number of consulting technical committees of the Rubber Division of the CPA was reduced from 23 to 11 because of the rapid rate of reconversion of the industry. Consumption of all rubbers and the production of rubber goods were at a record high during the first quarter of 1947. Wage agreements equivalent to that made between the Big Four companies and the URWA of an increase of 11½ cents an hour were concluded between many other rubber goods companies during April. Strikes took place at the Seiberling, Sun, and Ohio rubber companies in the course of negotiating these wage increases.

Long-Term Rubber Policy Considered; Private Trading in Rubber Begins; R-1 Order Revised

Emphasis in government and industry circles shifted from consideration of short-term to long-term rubber policy, following the definition of short-term policy by Public Law No. 24 of the Eightieth Congress on April 1. The Rubber Industry Advisory Committee of the Army-Navy Munitions Board, organized during April, replaced the Batt Inter-Agency Policy Committee as the top permanent Washington policy-making committee. Private trading in natural rubber began during April, and the rubber futures market resumed operations after five years at the Commodity Exchange in New York on May 1.

The number of Consulting Technical Committees of the Rubber Division of the Civilian Production Administration (OTC) was reduced from 23 to 11. Rubber Order R-1 was revised in two actions by this agency, one on April 18 and one on May 1, to permit a greater amount of natural rubber to be used in more rubber products and to permit larger inventories of natural, synthetic, and reclaimed rubbers to be carried by manufacturers of rubber goods.

Consumption of all rubbers and the production of rubber goods in the United States were at a high level during the first quarter of the year. The decision of the government to retain 160,000 long tons of natural rubber as a permanent stockpile and dispose of the remaining 155,000 tons, 45,000 tons at 25¾¢ a pound and 110,000 tons at 23¢ a pound, was expected, but should provide for some interesting developments in rubber supply and price during the coming months.

The Texas City disaster destroyed the former government styrene plant of the Monsanto Chemical Co., but a continuing downward trend in synthetic rubber production will offset the loss of this styrene in the rubber producing plants and will not cause any great difficulty in the rubber goods manufacturing industy.

Long Term Rubber Policy

The discussion of future long-term policy on rubber became of paramount interest with the advent of Public Law No. 24 of the Eightieth Congress which became effective April 1, 1947. Invitations were extended on April 12, to 31 leaders in the United States rubber industry to become members of the Army-Navy Munitions Board Rubber Industry Advisory Committee. The invitation tendered by the Board comprising Richard R. Deupree, chairman, Kenneth C. Royall, Under Secretary of War, and W. John Kenney, Assistant Secretary of the Navy, with the concurrence of the Secretary of the Interior, J. A. Krug, also announced that this committee would hold its first meeting on April 16, in Washington, D. C.

Members of the Rubber Industry Advisory Committee will represent the entire rubber industry in all of its phases from importing to manufacturing. They will aid in the development of industrial mobilization plans which will provide for an adequate supply of rubber in the event of a national emergency and will also advise the Army-Navy Munitions Board in the many different problems involved in the strategic stockpiling of natural rubber under the Stockpiling Law enacted by the Seventy-ninth Congress in July, 1946.

Representatives of the nation's rubber and associated industries invited to membership on the Rubber Industry Advisory Committee and to its first meeting were: W. T. Baird, Baird Rubber & Trading Co., New York, N. Y.; Charles H. Baker, Chas. H. Baker, Inc., Providence, R. I.; E. R. Bridgwater, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; George Bunn, Phillips Petroleum Co., Borger, Tex.; Earl Bunting, The O'Sullivan Rubber Co., Winchester, Va.; John L. Collyer, The B. F. Goodrich Co., Akron, O.; George Davidson, Standard Oil Co. of California, San Francisco, Calif.; Ray Boundy, Dow Chemical Co., Midland, Mich.; Harvey S. Firestone, Jr., Firestone Tire & Rubber Co., Akron,; Jacobus F. Frank, New York; A. L. Freelander, Dayton Rubber Co., Dayton, O.; Alan Grant, Charles T. Wilson Co., New York; F. D. Hendrickson., American Hard Rubber Co., New York; W. H. Huffman, Neches Butane Products Co., Port Neches, Tex.; R. G. Landers, Landers Corp., Toledo, O.; F. Thatcher Lane, Seamless Rubber Co., New Haven, Conn.; T. E. Martin, Lion Oil Refining Co., El Dorado, Ark.; Everett Morss, Simplex Wire & Cable Co., Cambridge, Mass.; Jean H. Nesbit, U. S. Rubber Reclaiming Co., New York; William O'Neil, General Tire & Rubber Co., Akron, O.; D. A. Patterson, H. A. Astlett & Co., New York; M. J. Rathbone, Standard Oil Co. of N. J., New York; Thomas Robbins, Jr., Hewitt-Robbins, Inc., Buffalo, N. Y.; G. L. Scheinler, Robert Badenhof Corp., New York; J. P. Seiberling, Seiberling Rubber Co., Akron; H. E. Smith, Raybestos-Manhattan, Inc., Passaic, N. J.; Herbert E. Smith, United States Rubber Co., New York; Oliver G. Vinnede, Dryden Rubber Co., Chicago, Ill.; James A. Walsh, Armstrong Rubber Co., West Haven, Conn.; R. S. Wilson, Goodyear Tire & Rubber Co., Akron and Charles W. Yelm, Gates Rubber Co., Denver, Colo.

Participants in the discussion at the April 16 meeting of the new Rubber Industry Advisory Committee reported that only subjects of a general nature were considered and that no definite conclusions were reached. Future similar meetings are expected.

In his April 15 Monthly Rubber Report, W. S. Lockwood commented at some length on this problem of long-term rubber policy. It was emphasized that national security is the foundation upon which a long-range rubber problem will be built and that there were three major considerations involved. The first was to have domestically produced rubber in sufficient quantity and sufficient quality produced in sufficient time to protect us in any future war which might cut off our natural rubber supplies. The second was to have an American synthetic rubber industry of sufficient volume and quality to serve as an effective brake on unwarranted price increases applying to that natural rubber supply. The third was a realization that national security begins before the atom bombs start falling, that an expanding world trade leads to greater hopes for world peace, and that rubber is of prime importance in world trade.

The first consideration is a technical problem and should be handled as such, it was said. Continued indefinite specification control very probably will harm synthetic rubber in the long run, and we should have as little of it and for as short a time as possible. In connection with a consideration of the minimum GR-S tonnage to be produced, Mr. Lockwood stressed the point that we must not forget that the synthetic industry's need is not of the *status quo* maintenance of an admittedly inferior product, but of *the technical development of constantly better products at constantly lower cost.* What is really needed is *incentive for research*—not found production or forced consumption of existing products.

We need to look *now* with great care at the commodity proposals of the International Trade Organization and see if in some measure they do not provide a possible answer—a mechanism for weighing *in our own interest* the economic future of the rubber producing areas, it was added.

It was reported from Washington late in April that sentiment is growing in favor of continuing indefinitely under the law the use of 30% synthetic rubber by the rubber goods manufacturing industry. The report was attributed to Representative Paul Shafer of Michigan, chairman of the House Armed Services Subcommittee in rubber, who said he expects to get hearings on long-term rubber legislation started during May. Two proposed

bills have been submitted to this subcommittee, one by Representative Fred Crawford of Michigan, and the other by Representative Leslie C. Arends of Illinois. Crawford was the author of the short-term rubber bill which became a law on April 1, 1947.

Too important features of this new Crawford bill are: (1) It would set up a Rubber Supervisory Board and establish a full-time Rubber Director. The Board would include the Secretaries of War, Navy, and State.[1] (2) It would also provide penalties for rubber manufacturers who fail to abide by quotas established to assure use of the prescribed minimum amounts of synthetic rubber.

Shafer said he did not "particularly like" either the idea of the supervisory board or the penalty feature, but did not see how they could be avoided, particularly the supervisory board. He expressed apprehension that establishing a full-time director would "create another bureau."

Government Agency Actions

The Civilian Production Administration (OTC), on April 1, issued a statement that except for the ban on private importation of natural rubber and natural rubber latex, which was lifted by Public Law No. 24 of the Eightieth Congress, effective April 1, present rubber controls under R-1 applying to allocation, consumption, and inventories of rubber, specifications for rubber products, and the importation of rubber products will continue in force. The CPA on April 1 issued Direction 14 to R-1 cancelling provisions which previously restricted importation of natural rubber and natural rubber latex to the Reconstruction Finance Corp.

The RFC, likewise on April 1, issued a statement that as of that date it would cease to be the sole importer of natural rubber and that as of March 31, 1947, it had on hand, afloat, or awaiting shipment a total of approximately 315,000 long tons of natural rubber, of which 160,000 long tons are considered a strategic stockpile for national defense. The balance of 155,000 long tons will continue to be sold to domestic consumers by the RFC, through its Office of Rubber Reserve, in accordance with allocation made by the CPA, or its successor.

The RFC stated that only 45,000 long tons of natural rubber remained to be disposed of at 25¾¢ a pound, after which the price for the remaining 110,000 long tons will be 23¢ per pound, ex dock or ex warehouse, plus the customary uniform freight charge, except as regards certain grades of special crepes and liquid latex for which prices will be announced later. On May 1 the RFC announced that effective with Natural Latex Purchase Permits issued on and after May 1, 1947, the price of normal latex would be 30¾¢ per pound, total dry latex solids, for tank car lots, plus applicable uniform freight charge. The price for centrifuged latex was set at 32½¢ per pound for tank car lots. Appropriate differentials in price for less than carload lots and drum sales were established. The prices for special crepes will be announced in the near future.

The CPA Rubber Division on April 18 issued amendments to R-1, permitting manufacturers of passenger-car tires (6.50 cross-section) to increase the natural rubber content of these tires from three to eight pounds, permitting producers of camelback for truck tires to use as much natural rubber as they wish, and allowing natural rubber to be used in all types of solid tires, rubber tracks and track blocks.

[1] See editorial, p. 806, Mar. 1947, India Rubber World, Editor

On May 1 the CPA Rubber Division announced that, effective May 2, manufacturers will be permitted to use larger amounts of natural rubber in 65 groups of non-transportation products under a revision of R-1. Permitted increase in the amounts of natural rubber which may be used, when compared with the total amount of new rubber material used each month, will be less than 3%, it was said.

Some of the important items receiving increased amounts of natural rubber are: brake linings, brake blocks and clutch facings; conveyer and elevator belting (for severe service only); crutch tips; food closures (molded, extruded, or lathe cut); friction tapes and splicing compound; miscellaneous hose and tubing; molds, rubber covered industrial rolls and roll coverings; rubber footwear; rubber thread; surgical tape and cohesive bandage and underground cable connectors.

Certain items now permitted natural rubbe for the first time are: beverage closures (molded, extruded, or lathe cut); blasting equipment; electrical cord protectors; embalmers supplies; hard rubber balls (croquet, duck pin, lawn, roque, and valve); hard rubber druggists' sundries; household and commercial health products; mine safety lamp parts; pressure-cooker gaskets; telephone and telegraph insulators; and unsupported sheeting.

Permitted inventories of various rubbers are increased to a 90-day supply of natural rubber, a 60-day supply of GR-S, and a 45-day supply of reclaimed rubber. Rubber dealers may now import and acquire all types of natural rubber, and to encourage such transaction the present R-1 contains no restrictions on the volume of business that rubber dealers may undertake. Supplies of natural rubber latex and pale crepe of all grades continue far short of demand, and it is necessary that more rigid controls on the usage of these types of natural rubber remain in effect, it was said.

Many of the individual items allowed percentages of natural rubber have been grouped in Appendix 1 of R-1. In some instances specific items have been lumped with other items of similar types to simplify manufacturers' problems and to allow them greater freedom of choice as to where they will use natural rubber.

The quantity of natural rubber imported under private purchase will govern any future change in the rubber order, it was pointed out. Unless the estimates of availability of natural rubber to this country, as developed by the International Rubber Study Group, are bettered, or unless rubber consumption decreases substantially, the specification controls now contained in R-1 will remain in effect for the next several months, the CPA stated.

CPA statistical data on rubber for February, released during April, gave consumption figures as follows: natural, 40,906 long tons; GR-S, 42,279; neoprene, 3,760; Butyl, 6,634; nitrile types, 431. Total natural and synthetic rubber consumption was 94,010 long tons. Consumption of reclaimed rubber was 25,620 long tons.

New supply and production of these rubbers was: natural, 30,318 long tons (including 1,241 tons dry weight of latex); GR-S, 49,377; neoprene, 2,949; Butyl, 6,349; and nitrile types, 450. The production of reclaimed rubber for February was 23,998 long tons.

Stocks at the end of February were reported as: natural, 283,556 long tons (including 5,804 long tons dry weight of latex); GR-S, 89,857; neoprene, 8,160; Butyl, 18,954; and nitrile types, 3,434. Month-end stocks of reclaimed rubber were 27,289 long tons.

New CPA Consulting Technical Committees Appointed

The number of consulting technical committees which advise the CPA Rubber Division has been reduced from 23 to 11 because various branches of the rubber goods manufacturing industry have advanced so far in solving their postwar manufacturing problems that certain of these committees are no longer needed, it was announced on April 11. With some committees which served during and since the war now relatively inactive, their numbers have been reduced to simplify administration by the CPA. Former consulting technical committees for certain segments of the industry have been consolidated under broader classifications and will continue such activity as may be necessary as subcommittees of existing committees.

For example, the Tire and Tube Repair Materials Consulting Technical Committee becomes a subcommittee of the Tire and Tube Consulting Technical Committee. Also the Mechanical Rubber Goods Consulting Technical Committee will have six subcommittees as follows: Brake Lining; Grinding Wheels; Jar Rings; Rubber Mountings, Shock-Absorbers and Dampers; Industrial Pressure-Sensitive Tape; and Rubber Thread. The Athletic Goods Committee and the Rubber Toy Committee have been consolidated because, in many instances, the products included in these segments of industry overlap, and the determination of whether certain end-products should be athletic products or toys has been a difficult decision.

The chairman and members of all the present consulting technical committees are:

Athletic and Rubber Toy Consulting Technical Committee: E. C. Brueggeman, co-chairman, Seiberling Latex Products Co., Barberton, O; O. D. Carlson, co-chairman, Pennsylvania Rubber Co., Jeannette, Pa.; R. T. Cartlidge, Sun Rubber Co., Barberton; W. B. Frye, U. S. Rubber, Providence; H. W. Gill, National Latex Products Co., Ashland, O.; J. G. Havey, Wilson Sporting Goods Co., Chicago; L. P. Hohlfelder, Barr Rubber Products Co., Sandusky, O.; L. J. Isom, Dewey & Almy Chemical Co., Cambridge, Mass.; Carl Lundgren, MacGregor-Goldsmith, Inc., Cincinnati, O.; W. J. O'Brien, Seamless Rubber; John Shira, Oak Rubber Co., Ravenna, O.; T. Van Etten, Midland Rubber Co., Cedar Rapids, Iowa; C. A. Webb, Weaver-Wintark Co., Shamokin, Pa.; L. C. Weimer, W. J. Voit Rubber Corp., Los Angeles, Calif.

Chemically Blown Sponge Consulting Technical Committee: J. F. McWhorter, chairman, Ohio Rubber Co., Willoughby, O.; C. Vaughn Castor, Brown Rubber Co., Lafayette, Ind.; Stanton Glover, U. S. Rubber, Naugatuck, Conn.; S. P. June, Virginia Rubatex, Bedford, Va.; H. S. Liddick, Davidson Rubber Co., Boston, Mass.; Marcus Orr, Goodrich; U. H. Parker, Dryden Rubber, Keokuk, Iowa; George Sprague, Sponge Rubber Products Co., Derby, Conn.; C. H. Zieme, Republic Rubber Division, Youngstown, O.

Coated and Combined Fabrics Consulting Technical Committee: Harold Nelson, chairman, U. S. Rubber, Mishawaka, Ind.; J. F. Anderson, Goodrich; Harry Dennenbaum, Aldan Rubber Co., Philadelphia, Pa.; Charles Dennison, Archer Rubber Co., Milford, Mass.; J. L. Haas, Hodgman Rubber Co., Framingham, Mass.; R. R. Lewis, Vulcan Proofing Co., Brooklyn, N. Y.; Hewitt MacPherson, Cambridge Rubber Co., Cambridge; A. F. Schildhauer, du Pont, Fairfield, Conn.; G. R. Spangenberg, Rainfair, Inc., Racine,

Wis.; J. W. F. Young, Federal Leather Co., Belleville, N. J.

Rubber Footwear Consulting Technical Committee: Chas. H. Baker, chairman; V. N. Hastings, U. S. Rubber, Naugatuck; J. H. Kelly, Tyer Rubber Co., Andover, Mass.; H. W. Martin, Hood Rubber Co., Watertown, Mass.; H. A. Stuart, Goodyear Footwear; A. H. Wechsler, Converse Rubber Co., Malden, Mass.

Hard Rubber Consulting Technical Committee: D. E. Jones, chairman, American Hard Rubber, Butler, N. J.; Wm. Dermody, Stokes Molded Products Co., Trenton, N. J.; E. R. Dillehay, Richardson Co., Melrose Park, Ill.; H. J. Flikkie, Goodrich; F. S. Malm, Bell Telephone Laboratories, Murray Hill, N. J.; C. P. Morgan, Vulcanized Rubber & Plastics Co., Morrisville, Pa.

Foamed Latex Products Consulting Technical Committee: J. J. Allen, chairman, Firestone Rubber & Latex Products Co., Fall River, Mass.; C. H. Barnes, Goodyear Tire; M. Berman, Hewitt; Marcus Orr; W. M. Reid, Dunlop Tire & Rubber Co., Buffalo; E. C. Svendsen, U. S. Rubber, Mishawaka.

Mechanical Rubber Goods Consulting Technical Committee: W. L. Smith, chairman, Goodrich; M. Berman; H. L. Ebert, Firestone Tire; D. F Harpfer, Goodyear Tire; L. J. Howell, Hamilton Rubber Mfg. Co., Trenton; M. R. Karrer, Electric Hose & Rubber Co., Wilmington; J. F. McWhorter; W. W. Sanders, Boston Woven Hose & Rubber Co., Cambridge; M. J. Sanger, General Tire, Wabash, Ind.; F. C. Thorn, Garlock Packing Co., Palmyra, N. Y.; W. L. White, Raybestos-Manhattan; C. H. Zieme; F. W. Frerichs, (Jar Rings) Cupples Co., St. Louis, Mo.; C. H. Mingle, Gates; V. N. Morris, Industrial Tape Corp., New Brunswick, N. J.; J. D. Morron, U. S Rubber, Detroit, Mich.

Sub-Committees of Mechanical Rubber Goods Consulting Technical Committee: Brake Lining: W. L. White, chairman; J. M. Kuzmick, co-chairman, Raybestos-Manhattan; Wm. Nanfeldt, Firestone Industrial Products Co., New Castle, Ind.; C. A. Schell, Thermoid Rubber Co., Trenton; R. E. Spokes, American Brakeblock Division of American Brake Shoe Co., Detroit; Edward Wells, Johns-Manville Corp., New York; F. G. Burk, A. P. de Sanno & Son, Inc., Phoenixville, Pa.

Grinding Wheels: W. L. White, chairman; H. V. Allison, Allison Co., Bridgeport, Conn.; F. G. Burk; H. C. Martin, Carborundum Co., Niagara Falls, N. Y.; R. D. Sevick, U. S. Rubber, Passaic; C. J. Waterman, Bancroft-Hickey Mfg. Co., Bristol, Pa.

Jar Rings: F. W. Frerichs, chairman; Harold Anderson, Ball Bros., Muncie, Ind; A. R. Brandt, Schacht Rubber Mfg. Co., Huntington, Ind.; C. C. Davis, Boston Woven Hose; L. J. DeHolczer, Crown Cork & Seal Co., Baltimore, Md.; R. D. Gartrell, U. S. Rubber, New York; L. J. Howell; E. A. Schwarz, Crunden Martin Mfg. Co., St. Louis.

Rubber Mountings, Shock-Absorbers and Dampers: J. D. Morron, chairman; Sherman R. Doner, Raybestos-Manhattan; M. J. Clark, Goodyear Tire, St. Marys, O.; H. L. Ebert; H. H. Fink, Goodrich; R. C. Henshaw, Lord Mfg. Co., Erie, Pa.; R. C. Knapp, secy., U. S. Rubber, Detroit; J. F. McWhorter; M. J. Sanger; H. E. Wening, Inland Mfg. Division, (GMC), Dayton.

Industrial Pressure-Sensitive Tape: V. N. Morris, chairman; C. E. Frick, Van Cleef Bros., Chicago; A. R. Gow, Seamless; H. J. Tierney, Minnesota Mining & Mfg. Co., St. Paul, Minn.; P. F. Ziegler, Bauer & Black, Chicago.

Rubber Thread: W. L. Smith, chairman; J. J. Allen; H. E. Cooper, U. S. Rubber, Providence; R. L. Cragan, Lloyd Mfg. Co., Apponaug, R. I.; G. R. Keltie, American Wringer Co., Woonsocket, R. I.; W. M. Reid; Oliver Thompson, Carr Mfg. Co., Bristol, R. I.

Medical and Surgical Rubber Goods Consulting Technical Committee: A. R. Gow, chairman; E. C. Brueggeman; W. B. Frye; Ezra L. Hanna, Davol Rubber Co., Providence; A. E. Hosier, Faultless Rubber Co., Ashland; George Lenhart, Wilson Rubber Co., Canton; H. S. Liddick; R. J. Limbert, Lee Rubber & Tire Corp., Conshohocken, Pa.; C. R. Porthouse, Pyramid Rubber Co., Ravenna; Raymond Ssulik, Acushnet Process Co., New Bedford, Mass.; Marcus Orr; P. F. Ziegler.

Sub-Committees of Medical & Surgical Rubber Goods Consulting Technical Committee: Rubber Bands: Marcus Orr; C. W. Howlett, Hodgman; Garrett Roberts, Weldon Roberts Rubber Co., Newark, N. J.

Surgical Adhesive Tape: P. F. Ziegler, chairman; John Clark, Bay Division (Parke, Davis & Co.), Bridgeport, Conn.; A. R. Gow; David Smith, Johnson & Johnson, New Brunswick, N. J.

Sole and Heel Consulting Technical Committee: W. E. Kavenagh, chairman, Goodyear Tire, Windsor, Vt.; G. B. Britton, and R. E. Hughes, International Shoe Co., Hannibal, Mo.; C. F. Hoover, Essex Rubber Co., Trenton; L. F. Leatherman, Gro-Cord Rubber Co., Lima, O.; R. W. Lowe, Endicott Johnson Corp., Johnson City, N. Y.; Allen O'Neal, Goodrich; Clarksville, Tenn.; W. F. Ridge, U. S. Rubber, Providence; Arthur Ross, Panther-Panco Rubber Co., Stoughton, Mass.

Sub-Committee of Soles and Heel Consulting Technical Committee: Leather Shoe Manufacturers: G. B. Britton, chairman; R. G. Ashcraft, Endicott Johnson; Roland D. Earle, Union Bay State Chemical Co., Cambridge; R. M. Frevdberg, Acme Backing Corp., Brooklyn, N. Y.; J. C. MacKay, J. F. McElwain Co., Nashua, N. H.; M. P. Medwick, New York Rubber Cement Co., Inc., Bronx, N. Y.; Warren Reardon, Daniel Green Co., Dogleville, N. Y.; H. M. Spelman Jr., Dewey & Almy.

Wire and Cable Consulting Technical Committee: R. A. Schatzel, chairman, Rome Cable Corp., Rome, N. Y.; J. T. Blake, Simplex Wire; A. D. Cummings, Collyer Insulated Wire Co., Pawtucket, R. I.; John Ingmanson, Whitney Blake Co., New Haven; A. R. Kemp, Bell Labs.; S. J. Rosch, Anaconda Wire & Cable Co., Hastings-on-Hudson, N. Y.; E. D. Youmans, Okonite Co., Passaic.

Tire and Tube Consulting Technical Committee: H. E. Elden, chairman, Dunlop; T. E. Boyle, Goodrich; R. Brasaemle, Lee; W. H. Denton, Goodrich; E. H. Gibbs, Seiberling; W. F. Hoelzer, Pennsylvania Rubber; Otto J. Lang, Armstrong Rubber; L. B. Martin, U. S. Rubber; J. E. McCarty, Goodyear Tire; H. J. Niemeyer, Firestone Tire; H. P. Partenheimer, Mansfeld Tire & Rubber Co., Mansfield, O.; H. B. Pushee, General Tire; J. Rockoff, Dayton.

Sub-Committee of the Tire and Tube Consulting Technical Committee: Tire and Tube Repair Materials: T. E. Boyle, chairman; R. J. Bonstein, Firestone Tire; B. C. Eberhard, Goodyear Tire; L. L. Fortune, Fremont Rubber Co., Fremont, O.; D. A. MacDonald, U. S. Rubber, Indianapolis, Ind.; N. E. Ries, Mohawk Tire & Rubber Co., Akron; F. C. Theiss, General Tire; H. F. Webster, Denman Tire & Rubber Co., Warren, O.

Trading in Rubber Resumed

Rubber brokers and importers, starting April 1, were able to buy rubber directly in the Far East, but no smooth flow of rubber into this country is expected until June. Some shipments from the Far East, however, were received during April.

Trading in rubber futures was resumed for the first time since February 6, 1942, at the Commodity Exchange in New York on May 1. Prices set in the first day of trading ranged well below present prices for physical rubber, paralleling discounts for future delivery in other commodity markets.

Despite initial active trading, many difficulties in the month-old free rubber market have to be ironed out before the futures market will be fully able to afford the industry needed protection against price fluctuations, traders said. The price established on May 1 ranged from 21.1¢ a pound to 19.40¢ a pound for those positions actually traded. Trading interest centered in the September and December contracts. The strength of the December delivery was attributed partially to buying for arbitrage with the London futures market.

A more complete review of the natural rubber market will be found in the Market Reviews section of this issue. This market review on natural rubber will now also be a regular feature of India Rubber World for the first time since early 1942.

RMA Tire Production Figures

Tire manufacturers appoach the peak demands of the hot weather driving period with inventories less than half their prewar level, The Rubber Manufacturers Association Inc., reported on April 23, with the release of the regular monthly report on production and inventory of automotive pneumatic casings and tubes. Daily average production of passenger-car tires for February was at an all-time record. Despite this record, manufacturers' war-depleted inventories continue far below normal. Consumer demand remains so high that the industry has been able to add to its inventory less than a half million units in the entire 12 months from February, 1946.

Prewar, the industry normally approached the hot weather driving period with upward of six million units on hand. Manufacturers ended last February with only 2,949,202 passenger tires in inventory, less than two week's production at the present rate. In February 1941, inventories stood at 8,057,485 units.

The report, which covers only automotive equipment and excludes solid tires or pneumatic casings and tubes for motorcycles, bicycle, aviation, agricultural and industrial equipment appears on the following page.

Carbon Black Plants Surplus

The War Assets Administration, on May 1, announced that six wartime carbon black plants (channel-type), which cost the government an aggregate of $20,282,000 and can produce a fifth of the nation's industrial needs for this material, are being offered for sale or lease. The six plants have a combined annual capacity of 126,000,000 lbs. The plants and their wartime operators are: Cabot Carbon Co., Gumon, Okla.; Chas. Eneu Johnson & Co., Monument, N. Mex.; Panhandle Carbon Co., Eunice, N. Mex.; Columbian Carbon Co., Seagraves, Tex.; United Carbon Co., Odessa, Tex.; and the Continental Carbon Co., Sunray, Tex.

A variety of proposals may be made for

any of the properties: (1) for purchase or lease of the entire plant at the present location; (2) for purchase or lease of the plant minus one or two burner units or other specified equipment for operation at the present site; (3) for purchase as a whole, except dwellings, for dismantling and removal; or (4) for purchase of one or two burner units, or other combinations of equipment and buildings, for removal. If the plants are sold for removal, the dwellings in each instance will be offered for disposal later, it was stated.

Monsanto Styrene Plant Lost

The explosion of the French ship loaded with ammonium nitrate in the harbor at Texas City, Tex., on April 16 touched off a series of blasts which destroyed a large part of that community, including a number of industrial plants, among which was the styrene plant of the Monsanto Chemical Co. This plant, built as part of the wartime synthetic rubber program, was purchased in 1946 by Monsanto from the government. It had an annual production capacity of 60,000 tons of styrene, but with the reduction in the output of GR-S during 1947, ample styrene from other sources is available for GR-S production. The loss will be felt more by the plastics industry and the Monsanto company in reduced capacity for the production of polystyrene.

In a statement to stockholders and employes made on April 30, Edgar M. Queeny, chairman of the Monsanto board, stated that the loss of such an important unit as the Texas City plant will have an adverse effect on profits, although Use and Occupancy Insurance will compensate during the coming 12 months to a large degree. The plant and contents were insured for $14,750,000, which covered the plant inventory of approximately $1,000,000 and the depreciated value of its buildings, machinery, and equipment on a 90% co-insurance clause. In addition the plant was covered by $7,500,000 of Use and Occupancy insurance and $2,500,000 of Public Liability Insurance.

Of the 451 persons on duty at the plant at the time of the disaster, 154 were either killed or are missing and believed dead; more than 200 required hospitalization; and 95 of the more seriously injured are still in hospitals. Many employes of outside contractors engaged in construction work on the plant were also killed or are missing. The technical staff suffered the heaviest proportion of casualties. Charles Comstock, division technical director; B. F. Merriam, chief plant engineer; R. E. Boudinot, production manager; R. D. Southerland, safety engineer; and F. A. Ruecker, chief power plant engineer, and all his staff were killed. Of 17 young and promising chemists who were supervising production in different departments, 16 perished. To this list may be added other technical men still in critical condition.

The Monsanto company offered immediate payments of $1,000 in case of death to each widow or nearest dependent of its employes. Almost all employes were covered by the group insurance plan of the company and the beneficiary of an insured hourly employe will receive about $7,000 and the widow of a salaried employe who earned $7,500 a year, will receive $17,500. Hospitalization costs of employes and their dependents not covered by group insurance will also be paid by the company. To provide for the cost of these and other payments, which were beyond the legal liabilities of the company and to reward outstanding cases of heroism, the board of directors of the Monsanto company appropriated $500,000.

ESTIMATED AUTOMOTIVE PNEUMATIC CASINGS AND TUBE SHIPMENTS, PRODUCTION, AND INVENTORY—FEBRUARY, 1947—JANUARY, 1947—FIRST TWO MONTHS 1947-1946

	1947				
Passenger Casings	February	% of Change Preceding Month	January	Two Months Total	1946 Two Months Total
Original equipment shipments	1,605,818	......	1,421,694	3,027,512	631,632
Replacement shipments	4,239,967	......	4,529,227	8,769,194	8,103,998
Export shipments	92,878	......	108,723	201,601	63,889
Total shipments	5,938,663	—2.00	6,059,644	11,998,307	8,799,519
Production	6,429,156	—6.67	6,888,566	13,317,722	9,289,874
Inventory end of period	2,949,202	+19.05	2,477,226	2,949,202	2,580,445
Truck and Bus Casings					
Original equipment shipments	531,778	......	500,322	1,032,100	420,297
Replacement shipments	776,338	......	834,877	1,611,215	1,752,885
Export shipments	112,727	......	103,905	216,632	120,024
Total shipments	1,420,843	—1.27	1,439,104	2,859,947	2,293,206
Production	1,486,277	—8.22	1,619,377	3,105,654	2,483,822
Inventory end of period	915,773	+7.63	850,863	915,773	1,014,187
Total Automotive Casings					
Original equipment shipments	2,137,596	......	1,922,016	4,059,612	1,051,929
Replacement shipments	5,016,305	......	5,364,104	10,380,409	9,856,883
Export shipments	205,605	......	212,628	418,233	183,913
Total shipments	7,359,506	—1.86	7,498,748	14,858,254	11,092,725
Production	7,915,433	—6.96	8,507,943	16,423,376	11,773,696
Inventory end of period	3,864,975	+16.13	3,328,089	3,864,975	3,594,632
Passenger, Truck and Bus Tubes					
Original equipment shipments	2,128,978	......	1,921,588	4,050,566	1,042,754
Replacement shipments	3,988,978	......	5,085,235	9,074,213	7,419,880
Export shipments	170,714	......	180,858	351,572	165,793
Total shipments	6,288,670	—12.51	7,187,681	13,476,351	8,628,427
Production	7,841,059	—10.07	8,719,463	16,560,522	9,509,573
Inventory end of period	6,621,188	+30.46	5,075,406	6,621,188	4,302,349

Labor-Management Relations News

Some of the advantages to the country as a whole and the rubber goods industry in particular, as a result of the Big Four-URWA wage agreement of March 22, became evident during April. The disastrous effect of a strike that would have halted the production lines that turn out 75 to 80% of the nation's passenger-car tires, a major part of the country's bus and truck tires, and many other rubber products, was more completely realized after the strike did not take place. The rubber goods industry settlement also aided in agreements reached in other industries, such as steel and electrical goods manufacturing. Wage settlements on terms equivalent to the Big Four agreement were concluded by many other companies in the rubber goods industry. Difficulties were experienced in some cases, however, when strikes were experienced at plants of the Seiberling, Sun, and Ohio rubber companies before a new wage contract was signed. The United States Department of Labor released information on the violations in the rubber goods industry of the minimum wage, overtime, and child labor provisions of the Fair Labor Standards Act and the Public Contracts Act, as found by complaint, selective and spot-check investigations. Canadian members of the URWA indicated that they would ask for wage increases when new contracts were negotiated.

Rubber Agreement Effects

The Big Four-URWA wage agreement of March 22 and the cancellation of the strike scheduled for March 23 in the plants of the Big Four companies prevented a drastic curtailment of production in the automotive industry and that part of the chemical industry supplying the rubber goods manufacturers. Not only would 50,000 rubber workers have been idle, but in the course of a month or two this strike would have thrown a half a million persons in the automotive and chemical industries out of work, it was estimated. Other industries and companies, the first of which was the United Electrical Workers (CIO) at the General Motors Corp. plants, followed the pattern of the rubber workers' union in their wage increase agreement. An increase of 11½¢ an hour in the base rates was granted, plus certain other benefits which caused this increase to be considered as totaling 15¢ an hour. However, with retroactive pay and settlement of inequities, the rubber worker's increase on this basis also could be considered as amounting to 15¢ an hour. U. S. Steel also signed an agreement with the United Steelworkers (CIO) during April which gave these workers a 12½¢ an hour increase plus certain other adjustments, but no retroactive pay.

Other New Agreements

The Mohawk Rubber Co., Akron, O., signed an agreement with the local URWA union on March 31 for a wage increase of 11½¢ an hour, retroactive to February 2 and including all the other provisions of the Big Four settlement.

As reported last month, General Tire & Rubber Co., Akron, granted a 11½¢ an hour wage increase to its workers late in March. In addition, it has been announced that this company will incorporate both the 18½¢-an-hour increase of March, 1946, and the 11½¢ increase of March, 1947, into the basic wage structure.

Seiberling Rubber Co., Akron, offered to incorporate all the provisions of the Big Four agreement into a new contract with its workers, but because of a dispute over intra-plant wage inequities, the first strike in 25 years began at this company's plant on April 11. Harry P. Schrank, vice president of the company, charged that the strike was brought about by "minority rule", while William Hackenberg, the local URWA union president, said the company's offer was twice presented to the members of the local union and that both times the members ordered the negotiating committee to reject the offer. A meeting between company representatives and the local union was arranged by Paul W. Fuller, resident conciliator for the Department

of Labor, on April 18, but produced no settlement. On April 20, the Seiberling company announced suspension of all activities and closing of its general office. At the same time the company issued an "ultimatum" in which it stated that it would withdraw "in its entirety" its wage increase and new contract offer of April 18 unless the local union accepted this offer by April 24. Company officials explained that the suspension of activities and the closing of the general office were necessary because of "indignities and inconveniences" imposed upon salaried employes. The local union president denied that there had been any difficulties between the salaried employees and the union members except that union pickets had stopped foremen from entering the plant because they had been doing "work ordinarily done by union members." On April 25 it was announced that since no reply had been received from the local union, the company was withdrawing its wage increase offer. Another meeting between the company and the local union was expected to be held during the week of April 28.

A partial strike developed at the plant of the Sun Rubber Co., Barberton O., during the early part of April. A dispute over the suspension of a pressroom worker for smoking in a restricted area caused this difficulty. Of the 1,400 employed at this plant only about 400 took part in this work stoppage. The local union and the company had negotiated a new wage agreement just before this dispute arose.

The Inland Mfg. Division of General Motors Corp., Dayton, O., and the local URWA union signed an agreement for a 11½¢-an-hour wage increase on April 21. This agreement will remain in effect until April 28, 1948.

The General Cable Corp., New York, N. Y., announced on April 23 that it had raised the wages of the workers in its several plants 11½¢-an-hour, effective April 13, for a period of one year. At the same time this company announced that prices for cables and wires used in building, automobiles, electrical utilities, and home appliances will be reduced from 6% to 12%.

The B. F. Goodrich Chemical Co. plant at Louisville, Ky., increased the wages of its workers from 11½¢ to 16½¢ an hour on April 29. This agreement with a local AFL union made the increase retroactive to April 6. Officials of the URWA (CIO) stated that they have petitioned the National Labor Relations Board for a bargaining election at this plant.

First Contract Anniversary

The Akron URWA members held a rally on April 28 to celebrate the tenth anniversary of the signing of the first union contract by a major rubber company. It was on April 28, 1937, that Firestone Tire & Rubber Co. became the first major rubber goods firm to reach an agreement with the URWA. The CIO took this occasion to point out that the passage of the labor laws now before Congress would set back labor relations to pre-1937 days, according to a spokesman for the national organization. The rally was called a "Defend Labor Rally" and was featured by an address by Allan S. Haywood, national vice president of the CIO, who lead the organizational drive in Akron ten years ago.

Ching on Labor Relations

Cyrus S. Ching, director of industrial and public relations, United States Rubber Co., spoke before the National Wholesale Druggists Association in Chicago, Ill., on April 23, on the subject of labor relations. Mr. Ching opposed compulsory arbitration and supported labor's "right to strike." In an outline of the present labor situation in this country, he stated that the process of legislation has gone too far, permitting a "labor monoply parallel to the business monoply that existed a half a century ago." Business monoply had to be smashed, he said.

Management should teach its employes the economics of industry since a postgraduate education of this sort would help build individual pride in the American industrial system. Business should not always be after the passage of laws to help it with its labor relation problems, he said, because meeting these problems is "just plain salesmanship."

Labor Department Report

The 1946 annual report of the Wage and Hour and Public Contracts Divisions, U. S. Department of Labor, shows that violations of the minimum wage, overtime, and child labor provisions of the Fair Labor Standards Act and the Public Contracts Act were found in 71% of the 300 inspections made in the rubber goods manufacturing industry during the year ending June 30, 1946. As a result, $106,000 in back wages was returned to some 2,400 underpaid employes, it was said.

Not all rubber goods manufacturers were inspected during the year because the Divisions are able to make complaint, selective and spot-check investigations in only a part of the nation's establishments in all industries covered by the two laws. However, the inspections in the rubber industry were sufficient to show that employers in this field still are in rather widespread violation, despite the fact that the vast majority apparently desire to comply with these laws. The report further shows that violations of the overtime provisions of the two laws were the most common type found.

The Divisions report a frequent cause of unintentional violations is misapplication by employers of the exemption provisions of the Wage and Hour Law, under which certain employes may be exempt from the law's minimum wage and overtime provisions as "executive," "administrative," or "professional" employes. As most manufacturers know, the Wage and Hour Law applies to all employes engaged in interstate commerce or in the production of goods for interstate commerce, and the law's provisions for a 40¢-an-hour minimum wage and time and one-half for overtime work beyond 40 hours apply in all cases unless an employee is *specifically exempt*. The Public Contracts Act applies generally to employes engaged in filling government contracts for more than $10,000.

W. R. McComb, recently named administrator of the Divisions, advises that the Divisions, through their regional offices, aid employers who are uncertain about the application of the laws to their employes. Regional offices of the Divisions are in Boston, New York, Philadelphia, Cleveland, Richmond, Atlanta, Birmingham, Nashville, Chicago, Minneapolis, Kansas City, Dallas, and San Francisco.

R-1 Restrictions Eased

Manufacturers of medium-sized passenger-car tires (6.50 cross-section) on April 18 received permission to use a greater proportion of natural rubber, according to amendments to Appendix II of R-1. The permitted amount of natural rubber for this size of tire was increased to approximately eight pounds from the previous figure of approximately three pounds.

At the same time, producers of camelback for recapping truck tires (8.25 and larger size tires of six-inch die width and 14/32-gage and up) are now allowed to manufacture this material with such quantities of natural rubber as they required.

"However, although the amount of natural rubber that may be used in these products has been increased, it does not mean that manufacturers will do so," W. J. Sears, director of the OPA Rubber Division, said, "because today it is not a question of how much natural rubber or how much American rubber is in a product.

"The rubber manufacturing industry is prepared to use American rubber in those products which they have learned to make so that they give greater service than products made before the war. Therefore, we have arrived at a state of improved technical knowledge and development where the public is able to obtain rubber products capable of giving the greatest service in history."

This greater freedom of choice in use of rubber materials has been made possible by the continuing availability of natural rubber in the Far East, according to CPA's Rubber Division. The supplies available to industry from both government stocks and private purchase are estimated to be sufficient to support a reasonable monthly increase in the consumption of natural rubber. Should all manufacturers of medium-size passenger-car tires and truck-tire camelback avail themselves of all the natural rubber permitted, the monthly consumption will be increased by some 5,000 long tons. At the going rate of production, this will mean that the rubber manufacturing industry will be consuming approximately 47% of natural rubber a month.

Other changes in Appendix II allow manufacturers a choice of new rubber materials in all types of solid tires, rubber tracks, and track blocks. These last two items are used on tractor-type automotive equipment for industrial and agricultural use. In addition, manufacturers are granted a choice of new rubber materials in the production of all tubes except those of 15-inch and 16-inch diameter, which will continue to be manufactured with American rubber.

A revised R-1 came out as we were about to go to press. Details appear on page 229.

B. F. Goodrich Chemical Co., Rose Bldg., Cleveland 15, O., has moved its West Coast sales office to Room 509, 714 W. Olympic Blvd., Los Angeles 15, Calif. R. E. Bitter is sales representative, handling Hycar American Rubbers, Kriston thermosetting resins, Geon polyvinyl resins, and Goodrite chemicals.

Link-Belt Co., Chicago 9, Ill., recently opened a new plant at 3405 Sixth Ave. South, Seattle, Wash., better to serve the Pacific Northwest and Alaska. The plant includes a steel shop, a machine shop, warehouse and factory branch store, and sales, accounting, and engineering departments.

American Anode, Inc., began manufacturing operations at its new plant in East Los Angeles, Calif., on April 23, according to Robert V. Yohe, president. The unit, started in October, 1946, and the first of its kind west of the Mississippi River, will have an annual capacity of 4,000,000 pounds of synthetic and crude rubber latices in raw and compounded forms. R. A. Lees, formerly with American Anode in Akron, is plant manager.

John H. Matthews
Raybestos Vice President
(*See page 236*)

D. K. MacLean
Farrel Export Manager
(*See page 244*)

E. A. Stevens
Director of Purchases
(*See page 239*)

A. J. Baldwin
Adamson United Representative
(*See page 242*)

Photo by Karsh

C. S. Band
Chairman of Board
(*See page 248*)

J. Ross Belton
Canadian Company Head
(*See page 248*)

Milton R. Holmes

Samuel R. Rhoads
Machinery Division Manager
(*See page 238*)

Fabian Bachrach

Paul R. McCampbell
Kleinert Vice President
(*See page 238*)

Tenschert Photo Co.

George D. Kratz
Latex Sales Representative
(*See page 244*)

EASTERN AND SOUTHERN

New Cameron Plant

Cameron Machine Co., 61 Poplar St., Brooklyn 2, N. Y., manufacturer of slitting and roll winding machines, has started construction of a new $400,000 plant expansion. The new building climaxes 40 years of progressive service in the development of winding and slitting machines for a variety of industrial applications. Construction began in August, but W. B. Wilshusen, company president, announced the plans officially last month.

The new plant is to be a two-story brick and steel building of modern design, with many up-to-date facilities for materials handling. Much of the wall areas will be glass, insuring a daylight plant in which considerable new machine tool equipment will be added to the present investment. The new factory is in the same approximate location as the present one, but the main factory entrance will be on Hicks and Fulton Sts.

Joining Mr. Wilshusen in making the announcement were Joseph S. Scheuermann, general sales manager, and H. E. Overacker, advertising and export manager. All three are well known to the rubber, textile, and paper industries for their long service with Cameron Machine.

Cameron Machine was started in a basement in Brooklyn, at Fourth and Baltic Sts., in 1906 by James A. Cameron. Very early in his career Mr. Cameron developed the basic Cameron principle of the pressure slitting and roll winding of rubber, fabrics, paper, and other compositions, and the growth of the company and all its modern models are based on development of this basic principle.

Soon the business had grown to such an extent that the property on and adjacent to 61 Poplar St. was purchased by the company. After the first World War an abandoned church on the property was converted into factory space, and other buildings were subsequently taken over.

Mr. Cameron devoted himself exclusively to winding and slitting machines from the beginning, and he was then, and the organization is said to be now, the only firm specializing exclusively in winders and slitters.

The first Cameron machine was a 42-inch model. Today there are 300-inch winders in operation, and the company has placed "Camachines" in service throughout the world.

The present Cameron management has been with the company for many years. Mr. Wilshusen, for instance, joined Cameron in 1915. He became president in 1934, a year after James A. Cameron died.

Examining Drawing of Cameron's New Plant: (Left to Right) Sales Manager Joseph S. Scheuermann, President W. B. Wilshusen, and Advertising and Export Manager H. E. Overacker

Cameron starts its new building with an excellent war record behind it. The company built machines for aircraft production, shell containers, and made winders for rolling of nitrating pulps. It also manufactured valves for the Navy and ground bronze rudders for mine layers.

It enters peacetime production with more than 700 machines on order—$4,000,000—to add to the records of the 5,000 Cameron machines now in operation throughout the world. Despite this backlog of orders, Cameron maintains its service organization at top efficiency. In addition to the Brooklyn personnel, which handles the East and the South, there is a Midwest office at 111 West Monroe St., Chicago, Ill., and the Far West is handled by the Pacific Coast Supply Co., at Portland and San Francisco. A subsidiary company, Cameron Machine Co. of Canada, Ltd., with offices at Montreal and manufacturing facilities at Dundas, handles Canadian business.

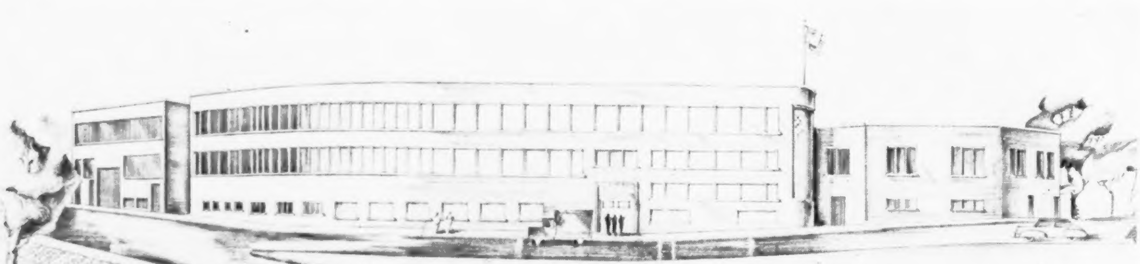
New York Safety Convention

The seventeenth annual Safety Convention and Exposition, sponsored by the Greater New York Safety Council and co-operating agencies, was held at the Hotel Pennsylvania, New York, N. Y., March 25 to 28. The exposition, which recorded an advance registration of 7,500, featured the displays of 87 companies in 114 separate exhibits, and covered 11,250 square feet in the hotel. The newest products of chemical and physical research in the interests of safety were displayed alongside of such old standbys as first-aid kits, respirators, iron hats, and non-skid shoes.

As in previous years, rubber and rubberized items were very much in evidence, while applications of vinyl resins and plastics showed noticeable gains. The rubber in use ran the gamut from GR-S to natural to reclaimed, including combinations thereof, and applications of neoprene in oil-resisting items were also widely featured. Displays of rubber goggles, masks, respirators and similar items were shown by American Optical Co., Miller Products, Inc., and W. S. Wilson Corp., all of New York; Davis Emergency Equipment Co., Inc., Standard Safety Equipment Co., both of Newark, N. J.; Dunn Products, Chicago, Ill.; Guardian Safety Equipment Co., East Orange, N. J.; Mine Safety Appliances Co., Pittsburgh, Pa.; Pulmosan Safety Equipment Corp., and Wahlert Products Corp., both of Brooklyn, N. Y.; Scott Aviation Corp, Lancaster, N. Y.; Welsh Mfg. Co., Providence, R. I.; and Willson Products, Inc., Reading, Pa. Safety shoes with rubber heels and soles were exhibited by Iron Age Division of H. Child & Co., Inc., Pittsburgh; Lehigh Safety Shoe Co., Inc., Allentown, Pa.; Miller Products, Inc.; Safety First Shoe Co., Holliston, Mass.; Sundial Shoe Co., Manchester, N. H.; Thom McAn Safety Shoes, New York; and Titan Safety Shoe Co., Boston, Mass.

A complete line of rubber safety mats was displayed by the American Mat Corp., Toledo, O. Rubber gloves were shown by Industrial Gloves Co., Danville, Ill.; Olympic Glove Co., New York; and Safety Clothing & Equipment Co., Cleveland, O. Rubberized and vinyl coated clothing were featured by Dunn Products; Olympic Glove Co.; Pulmosan Safety Equipment Corp.; and Safety Clothing & Equipment Co. A newcomer to the show was E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., which gave a display on the use of color conditioning for industrial safety.

The safety convention, under the general chairmanship of William F. Brown, presented an extensive program during the four-day meeting. There were 43 individual group meetings covering all phases of domestic, marine, and industrial safety, at which some 125 papers were presented in addition to 10 panel discussions. The program also included safety demonstrations, showings of safety motion pictures, committee meetings, luncheons, and the Council's annual dinner on March 27, at which Charles A. Kirk, vice president of International Business Machines Corp., spoke on "The Right to Be Safe."



Wash Drawing of the New Cameron Machine Plant Being Built on Brooklyn Parkway

Tex-Knit Burnproof Ironing Board Cover

Asbeston Product Wins Award

Lewis & Conger, one of Gotham's leading housewares stores, 45 St. and Ave. of the Americas, New York 19, N. Y., held its second annual safety award dinner on April 8 at the Waldorf-Astoria Hotel, at which manufacturers whose products made the foremost contribution to safety in the home last year were honored. There were seven Honorable Mentions, and the winner of the National Home Safety Award was Textile Mills Co., Chicago, Ill. The large bronze plaque was received from President Richard V. Lewis, of Lewis & Conger, by Kurt Goldsmith, of the textile company, for its product, the Tex-Knit Burnproof Ironing Cover. In his brief talk Mr. Goldsmith revealed that this cover was made of Asbeston, product of the United States Rubber Co., Rockefeller Center, New York 20.

Next speaker was H. E. Sunbury, Asbeston sales manager for the rubber company, who touched on highlights in the history of Asbeston. This asbestos yarn, which was patented in 1939, is woven into fabrics that now have many end-uses in the home and industry, but during the war Asbeston was used for fire-fighters' suits for Army and Navy. Peacetime reconversion resulted in such products as the ironing board cover, Carosel dish towels, and Asbeston-glass draperies for home, theaters, night clubs, schools, hospitals, and ships. Asbeston also finds use in commercial laundries, electrical insulation, laminated plastics, flexible ducts for hot air, safety clothing for industrial workers.

Mr. Sunbury also introduced to the large audience H. Gordon Smith, general manager of U. S. Rubber's textile division, and B. H. Foster, textile section manager at the company's general laboratories at Passaic, N. J., who was largely instrumental in the development of Asbeston.

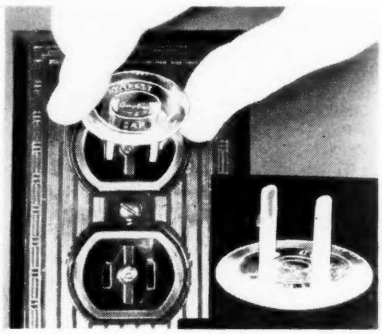
Final speaker at the affair was Major General Leslie R. Groves, military chief of the wartime atomic project, who called for vigorous measures to combat home accidents which in two years killed more people in America than the atomic bombs killed in Japan. General Groves also mentioned a few of the safety precautions adopted at the Manhattan Project.

After dinner an exhibit of the eight safety products and other Asbeston goods was opened to the gathering. Included in the seven Honorable Mentions were the Safeway window cleaner made by Safeway Specialty Corp., New York, and the Amerline plastic safety cap, by Amerline-Chicago, Chicago. The latter, of polystyrene plastic, is for insertion in all open wall outlets to protect children from possible shocks and burns. The window cleaner, made of "featherweight" magnesium, features an adjustable "jointed arm" long enough to reach outside panes, while the user stands safely inside, and hard-to-get-at corners, and a reversible head with a felt side for washing and a rubber squeegee for wiping.

Kirkbride Joins Houdry

C. G. Kirkbride has joined Houdry Process Corp., as director of the Houdry laboratories, according to Arthur V. Danner, executive vice president. Mr. Kirkbride will make his headquarters at the Houdry laboratories where more than 350 research people are employed in the eight research buildings erected on seven acres of land near Marcus Hook, Pa.

Mr. Kirkbride taught chemical engineering at Texas A & M College for two years after having served as chief of chemical engineering development for Magnolia Petroleum Co. at its Dallas research laboratories. His long experience in the oil industry includes positions as assistant director of research for Pan American Refining Co. and as research engineer with Standard Oil of Indiana. He is also chairman of the program committee for the American Institute of Chemical Engineers and is a director of the AIChE, serving on a number of committees. Besides Mr. Kirkbride is author of many technical papers and of the book "Chemical Engineering Fundamentals," soon to be published by McGraw-Hill Book Co.



Amerline Safety Cap

The director of Houdry laboratories was born in Tyrone, Okla., 40 years ago. He took his undergraduate and post-graduate work in chemical engineering at the University of Michigan. He is married and the father of one son.

Producing More Carbon Black

Columbian Carbon Co., New York, N. Y., recently reported that production and shipments of carbon black during January and February, this year, were well ahead of production and shipments for the 1946 months.

Last year, moreover, the company reached record output and shipments of carbon black. The respective figures were 266,272,195 pounds (exclusive of 31,013,488 pounds produced for associated companies) and 296,493,365 pounds. In 1945, 245,651,499 pounds of carbon black were produced.

In 1946 the company's carbon black sales totaled \$15,975,688, or 46.49% of the company's total sales of \$34,363,005; while the respective figures for 1945 are \$11,726,675, 43.04%, and \$27,244,318.

Since present demand for carbon black is about double prewar and since the demand is growing for natural gas as a domestic and industrial fuel, the price will rise, and the volume of gas available for carbon black manufacturers will be limited. These factors thus lead Columbian Carbon officials to believe that furnace blacks will supersede channel blacks in rubber compounding.

The company also has started initial production of a furnace black said to be fully equal to channel black for both natural and synthetic rubber.

Plastics, Rubber Plants Merge

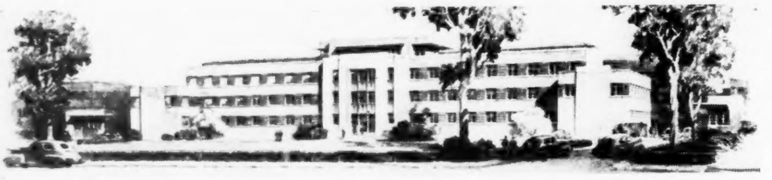
The plant and processes of the plastics division of Andover Kent Aviation Corp. have been merged with the facilities of the Rodic Rubber Corp., New Brunswick, N. J., a wholly owned subsidiary, it was announced April 9 by John J. Brooks, president of both companies.

During the war Andover Kent developed a low-pressure plastic molding process now extensively used in electronic equipment manufacture and consumer products such as Sav-Ice Buckets. Rodic Rubber Corp., for 20 years a manufacturer of high-grade mechanical rubber goods, has been identified also with the production of sheeting and molded articles of polyvinyl resins.

The firm plans extensive development in both rubber and plastics, including several new consumer items.

Yarnall-Waring Co., Mermaid Lane, Philadelphia 18, Pa., has sponsored the production of a new 16 mm., 30-minute color and sound motion picture entitled "An Engineering Reason." The film describes modern steam and mechanical engineering research which has been responsible for the revolutionary improvements in steam plant auxiliaries. It covers both generation and utilization of steam under low, medium, and high pressure and temperature conditions. A commentary by Lowell Thomas makes the film clear and interesting to engineer and layman alike. Produced and distributed by Hathen Productions, Philadelphia 3, prints are available without cost for showing before technical societies, plant engineer groups, engineering schools, and other organizations, if requests are made on a company or organization letterhead.

Safeway Window Cleaner



Architect's Drawing of New Carbide & Carbon Research Center at South Charleston, W. Va.

Raybestos Advances Three

At the annual stockholders' meeting of Raybestos-Manhattan, Inc., at the Biltmore Hotel, New York, N. Y., April 1, and at the directors' meeting immediately following, two vice presidents and a director were added: John H. Matthews elected vice president in charge of the Manhattan Rubber Division, Passaic, N. J.; O. H. Cilley, assistant general manager of the United States Asbestos Division, Manheim, Pa., made a vice president; A. F. Heinshon, general manager of General Asbestos & Rubber Division, North Charleston, S. C., placed on the new board of directors.

Mr. Matthews started as a machine shop draftsman with Manhattan in 1914 after graduating from Stevens Institute of Technology as a mechanical engineer. He was later made foreman of the compressed asbestos sheet department and then manager of the belt, clutch facings and brake lining departments. During World War I, he served in the Air Corps as a pilot and engineer officer for 1½ years. He became assistant factory manager in 1940, and in 1942 became assistant general manager of the Manhattan Division.

In 1902, Mr. Cilley entered the employ of C. G. Sargent Sons Corp., Graniteville, Mass. manufacturer of textile machinery, with which he continued in various capacities until 1920. He became associated with the United States Asbestos Co. (now the United States Asbestos Division) in March, 1920, as plant superintendent and in 1928 became assistant general manager. He has been on the board of directors since 1941. He is a member of the Society of Automotive Engineers and a director of the Mechanical Packing Association.

Mr. Heinsohn completes 25 years with the General Asbestos Division this year, having joined in 1922 shortly after graduating from the Citadel. He has been promoted to several important jobs and in June 1944, became general manager of that division.

New offices and warehouse facilities for Raybestos-Manhattan, Inc., have been occupied at 131 Mission St., San Francisco 5, Calif. The new quarters will provide adequate space for a large stock of belting, hose, other industrial rubber products, and packings, to serve West Coast customers efficiently.

Manhattan Rubber recently announced that Asbestos Co. of California, 941 16th St., San Francisco, will represent Manhattan in the San Francisco area. The Asbestos company will carry a complete stock of belting, V-belts, hose of all types, and other industrial rubber products. Its customers will also have the advantage of the proximity of the Raybestos-Manhattan warehouse in San Francisco.

National Oil Products Co., Inc., First and Essex Sts., Harrison, N. J., has changed its name to Nopco Chemical Co., Inc., but has made no change in products or policies.

Erecting Research Center

Carbide & Carbon Chemicals Corp., 30 E. 42nd St., New York 17, N. Y., has announced that construction of its new research center at South Charleston, W. Va., is now under way. The new center will replace existing facilities and will eventually house the company's fundamental research activities pertaining to new organic chemical and resin producing processes. Upon its completion, the present research unit will provide additional process control laboratory facilities for the company's South Charleston plant.

The new center, for which building drawings are substantially completed, will be located on part of a 140-acre tract recently acquired about a mile from the company's South Charleston plant. Authorization to proceed with site preparation, foundations, and structural steel erection has been obtained from the CPA Office of Temporary Controls. Further construction will proceed as rapidly as CPA approval can be obtained, dependent upon availability of construction materials. Engineering and construction contracts have been awarded, and grading and foundations have begun for the main research building, a service and power building, and a cafeteria. Development and pilot-plant facilities will follow later.

The new facilities will reflect the most modern trends in buildings and equipment.

The main building, which will house, in addition to the laboratories, a library, offices for executive and technical personnel, and other auxiliary functions, will be completely air-conditioned. Individual laboratories will be occupied by two or three research workers. Flexibility is the keynote of the design so that each research group will have the utmost latitude in arranging its laboratory to suit the requirements of the project. The main research building is designed as a three-story, T-shaped structure of steel and brick masonry construction, 325 feet long by 96 feet deep.

Leases Plastics Plant

United States Rubber Co. has signed a long-term lease on a plant in Chicago, at 2638 Pulaski Rd. and Schubert Ave., for production of new plastic materials. The plant is of modern, single-story, daylight construction. A three-story concrete building, partially air-conditioned, will be used for the administrative department. The plant will be serviced by spur tracks connecting with the Chicago, Milwaukee & St. Paul Railroad.

Installation of machinery began early in April, and it is expected that manufacturing operations will start about July 1.

About 300 people will be employed during 1947, with the number increasing as greater production is attained.

The company recently signed a 15-year lease for a plant on Birnie Ave., Springfield, Mass., for tire storage purposes in connection with the Fisk tire plant at nearby Chicopee Falls.

The company's consolidated net sales in the first quarter of 1947 were approximately 40% ahead of those in the same period last year, President Herbert E. Smith told stockholders at the annual meeting in Passaic, N. J., on April 15.

"Our sales in the first quarter averaged just under $50 million a month, which is at an annual record rate of almost $600 million a year," Mr. Smith said.

"It is expected that practically all our factories will continue to operate at capacity throughout the year. Shortages resulting from the war still exist in many rubber products. Also, a great potential market awaits new products. And although the demand for tires is approximately in balance with supply, this does not mean the industry will produce a lot less tires this year than last.

"We estimate that more than 60 million passenger-car tires will be produced in 1947. This is within six million of last year's all-time high. Of this year's output, it is believed that 40 million tires will be needed for replacement; at least 18 million will be required for new automobiles, 1½ million passenger-car-size tires for new light trucks, and 800,000 for export.

"In addition 13½ million truck and bus tires are expected to be produced, bringing the total production of passenger-car, truck and bus tires in 1947 to approximately 74 million units, which is only some eight million less than last year."

Mr. Smith said the company planned to spend more than $28 million this year for new plant and property and for rehabilitation of existing facilities. About $24 million went to similar purposes last year.

Comparing the company's record of 1946 with the last peace-time year of 1940, Mr. Smith said that sales of $495 million were more than double; that net profit of $23 million, equal to 4.7% of sales, was slightly more than double; that employment was up about 50% and that payroll had tripled.

Personnel Changes

Eugene M. McColm has been assigned to the post of technical director of the plantation division, United States Rubber Co., J. W. Bicknell, managing director, announced last month. As research chemist of the plantations before the war, Dr. McColm played an important part in the development of latex processing methods. His current responsibilities will include bringing the company's new centrifuging and creaming plants into operation and the development of improved methods of latex production.

Born in Bloomington, Ill., Dr. McColm is a graduate of University of Illinois and received his Ph.D. degree in chemistry from Columbia University. He joined the rubber company in 1927 as a chemist with the plantation division located in the Far East. He served in the Navy for two years during World War II and spent a period with Naugatuck Chemical division, being concerned there in the development of agricultural and subsequently aromatic chemicals.

Richard P. Harris has been made factory manager of the electroforming department of U. S. Rubber at Detroit. He was formerly assistant to the factory manager, Chance Vought Division, United Aircraft Corp,, Stratford, Conn. Mr. Harris was graduated in mechanical engineering from Pratt Institute in 1933 and has held several positions of responsibility in metals fabrication and in industrial engineering.

E. S. Little has been appointed merchandise manager of Gillette tires and tubes. He joined the company in Kansas City in 1937 and before the war was a branch representative for the tire engineering and service department in Dallas, later being promoted to field service representative. In 1942 he was assigned to the Army Air Forces school at Detroit as an instructor. During the war Mr. Little served as AAF overseas technical representative, setting up and supervising rubber repair shops to service aircraft tires, fuel tanks, and other rubber parts. He returned to the Detroit plant in 1945 as Gillette and Federal product engineer. In his new position Mr. Little succeeds F. A. Foster, who has been promoted to district manager, Federal Tire division, for the eastern area.

J. L. Anderson has been appointed district manager for Fisk tires in the Pittsburgh district. He previously was territorial representative for Fisk in western New York and prior to that covered a Virginia territory. He is also a veteran of World War II.

Mr. Anderson succeeds M. C. Welshimer, who was transferred to Denver because of his health. Mr. Welshimer will be in charge of Fisk sales activities in the Denver area, which is under the jurisdiction of G. A. Wood, Los Angeles district manager.

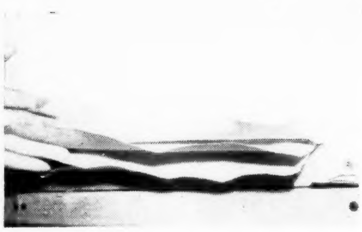
John A. Aron has been appointed tire sales manager of United Rubber Export Ltd. For the past seven years, he was sales manager of the Fisk Tire Export division. His other positions with Fisk Tire Export since 1929 included those of export advertising manager, assistant manager of Latin-American sales, and assistant sales manager. Mr. Aron was graduated in 1929 from the Wharton School of Finance and Commerce, University of Pennsylvania, where he majored in foreign trade.

F. B. Davis, Jr., chairman of U. S. Rubber, was reelected a board member of National Industrial Conference Board, Inc., 247 Park Ave., New York 17, at its meeting on April 17.

Recent Developments

A new method of radiant heating employing electrically heated ceilings is operating successfully in an experimental house at Knoxville, Tenn. The electrified ceilings, developed by U. S. Rubber, contain a heating element of conductive rubber sandwiched between two thin layers of plastic-impregnated fabric. The new heating system eliminates radiators, hot-air registers, furnaces, flues, fuel tanks and coal bins, and is automatically controlled by a thermostat. The house selected for the test was designed and built by the Fonde Construction Co. It is bungalow type consisting of living room, bedroom, hall, combination dining room and kitchen, glass-enclosed porch, and bath, all equipped with ceiling heat. On the basis of available data the Fonde Company estimates that the house can be heated at a cost of $72 a year. Although power rates in the Knoxville area are quite low, the firm believes that it is practical and economical to use electricity in any part of the United States provided the homes are properly designed and insulated to utilize this type of heating.

Special emphasis was placed on insulation in building the house, which has no basement. The floors are made of concrete with a special surface as smooth as hardwood. Heat from the ceilings keeps the floor 15 degrees warmer than the floors of conventionally heated homes, it is claimed. The new heating system was first turned on in February and has been operating ever since.



Construction of U. S. Rubber's Electrified Ceiling Shows Conductive Rubber Heating Element Sandwiched between Two Layers of Plastic-Impregnated Fabric

The house is occupied by Mr. and Mrs. Harrison J. Hines, who report that the temperature hovers between 69 and 70 degrees, the equivalent of 74 or 75 degrees of regular heat produced by a radiator or other localized unit. The surface temperature of the ceiling itself remains at 110° F.

Ceiling heat operates on the same principle as the sun, according to R. D. Gartrell development manager of U.S. Rubber's Passaic, N. J., plant, under whose supervision the product was perfected. The air itself remains relatively cool; the heat is absorbed by the occupants and nearby solid objects, such as furniture, floors, and walls. The panels developed for ceiling heat are four feet square and are installed by conventional methods. Electricity is conducted to the panel edge by copper wire, but there is no wire in the heating areas. The ceilings are painted or papered in the conventional manner. In addition to ceiling panels, U. S. Rubber is developing conductive rubber heaters in the form of decorative screens to provide temporary heat in bathrooms, bedrooms, and other parts of the house which are inadequately heated by present methods. The supply of these heaters and of the ceiling panels will be limited for several months because of current shortages of materials and production facilities.

Kuron, a new elastic fabric using a revolutionary manufacturing principle, is now being made by U. S. Rubber. The fabric does not depend upon elastic yarn or rubber thread for its elasticity. During manufacture, specially designed fabrics are condensed to shorter lengths, spread with natural rubber latex, dried, and cured. The degree of stretch can be accurately controlled by this process and can be made to vary from 50 to 150% of the material's length. The fabric can be produced 36 inches wide and in a range of colors, weights, and designs. It can be made of rayon and wool, rayon and cotton, two different rayons, two different cottons, or of only one fabric. Kuron is said to be long wearing and to retain its elasticity after many washings. Applications developed include upholstery, shoes, sport clothes, girdles, swim suits, and baby pants.

Fresh eggs dropped from the roof of a 100-foot high building in New York landed without breaking on a three-inch thick pad of soft cellular rubber made by U. S. Rubber. The demonstration took place before a group of amazed spectators at the New York Hospital-Cornell Medical Center, where a research group is engaged in studying the mechanical factors that cause injuries in aviation accidents. Edward Bergen, of U. S. Rubber, dropped a series of eggs from the roof of one of the hospital buildings 11 stories high. Several missed the rubber pad and smashed on the sidewalk. Those hitting the rubber target bounced back into the air, in some cases as much as 25 feet, and were caught on the rebound by Harold Taylor, a rubber chemist. R. D. Gartrell, development manager of U. S. Rubber's Passaic, N. J., plant, emphasized that cellular rubber, used in the past as an insulator and buoyancy material, should not be confused with sponge rubber which it resembles in feel and appearance. Cellular rubber is lighter than cork, is moisture-proof, and has certain properties not possessed by any other material. It derives its cushioning capacity from millions of microscopic cells filled with nitrogen gas. These tiny cells, about 250,000 per cubic inch, allow the material to conform immediately to the shape of an object thrown against it, giving support and at the same time exerting pressures that offset the effects of the blow. The air in sponge rubber escapes from the area under impact; whereas in cellular rubber the gas trapped in each cell behaves like a tiny balloon.

With the lifting of government restrictions, U. S. Rubber announced that it would begin immediate production of white sidewall tires in all its tire plants, in Detroit, Mich., Los Angeles, Calif., Eau Claire, Wis., and Chicopee Falls, Mass. The first of these popular tires, which have not been produced since before the war, will be available to motorists within a few weeks, said H. N. Hawkes, assistant general manager of the company's tire division.

Many brands and sizes of the company's tires will be produced in white sidewall form. Among these will be the new U. S. Royal Master, which will be made with an all-natural rubber tread, Mr. Hawkes announced.

"Production of the premium Royal Master was suspended six years ago," he said. "Since that time the company has delayed its return until it could be produced with white sidewalls and a long wearing tread of natural rubber. Rayon cord of stronger than prewar construction will be used in its plies."

While production of Royal Masters will begin immediately, they will not reach tire distributers in large quantities for at least a month or six weeks, it was said.

U. S. Rubber reports that rubber bathing shoes are going into production for the first time since 1941. They will be made in women's and children's sizes and will be available in limited quantities this spring.

A touring guide service will be offered to motorists this spring by distributers of Fisk tires. This personalized service has been arranged with the cooperation of Rand McNally & Co., which will provide maps showing suggested routes to and from each motorist's destination. Recommended routes will be based on the latest information on road conditions and first-hand knowledge of scenic beauty and points of interest. Fisk distributers will announce the service to their customers through personal letters and window displays. "Welcome home" messages will also be sent to motorists upon return from their trips.

Advance Solvents & Chemical Corp., 245 Fifth Ave., New York 18, N. Y., has added to its staff Henry P. Pryor, who will be the specialist in charge of technical service and sales to the rubber industry. Mr. Pryor, who was graduated from the University of Maine a decade ago, has worked for Rodic Rubber Co., Garwood, N. J., United States Rubber Co., Naugatuck, Conn., and R. T. Vanderbilt Co. at its laboratories in Norwalk, Conn.

Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa., has announced that Guy Berghoff, director of public relations, will assume direction of all the company's advertising activities. Pittsburgh Plate, a leading producer of glass, paints, chemicals, and brushes, will continue to maintain separate advertising departments in these four divisions.

Mr. Berghoff joined the firm in 1934 as assistant manager of glass advertising and promotion. He served in that position for ten years prior to his appointment as director of public relations. Before joining Pittsburgh Plate, he was associated with the *Chicago Daily News* and the City News Bureau at Chicago.

Appointment of Daniel R. Moser as Minneapolis sales representative for the Columbia Chemical Division was announced last month by W. I. Galliher, executive sales manager for the Division. Mr. Moser joined the Columbia Chemical research department at the Barberton, O., plant in 1938 upon his graduation from the College of Engineering at West Virginia University. Commissioned in the U.S. Army shortly after Pearl Harbor, he served in the European, African, and Middle East theaters. Upon his separation from the service early last year with the rank of captain, he returned to the technical and sales departments of the Columbia Chemical Division.

O'Sullivan Rubber Corp., Winchester, Va., has announced that at a meeting of the board of directors on April 8 the following changes were made in the officers of the company. In addition to James N. Mason's election as executive vice president, three vice presidents also were elected, A. C. Halvosa, W. S. Winterson, and R. H. Folger. P. L. Hockman, formerly assistant secretary and assistant treasurer, was elected secretary and assistant treasurer. He will also continue as comptroller. A. C. Halvosa, formerly secretary and treasurer, has been with O'Sullivan for the past 19 years. Mr. Winterson, with the company 38 years, is district sales manager of the New York and New England division. Mr. Folger, manager of the Laing, Harrar & Chamberlain division at Philadelphia, has been with that division 21 years.

Adhesive Products Corp., 1660 Boone Ave., Bronx 60, N. Y., manufacturer of a complete line of rubber and latex industrial cements, has announced the creation of a new research laboratory designed to assist manufacturers in solving their special cementing problems. This research service is being offered without cost to manufacturers, it was stated, because most plants cannot afford to spend the time and money required to develop their own laboratories. However, failure to select and test proper adhesives for specific industrial operations has resulted in losses to industry running into thousands of dollars each month. The new laboratory service is under the supervision of chemists with broad industrial backgrounds and contains modern testing equipment which includes a Scott tester, Fadeometer, oxygen bomb, and various precision viscosity measuring machines. The laboratory welcomes problems from manufacturers involving such materials as plastics, rubber, cork, fiber, glass, tile, paper, leather, fabric, metal, tinfoil, wood, leatherette, and sponge rubber.

Samples of the proper adhesives for the specific application will be sent without charge to the manufacturer upon completion of the individual tests required.

Thermoid Co., Trenton, N. J., to supply the need of increased expanded service facilities, opened a new warehouse in Wabash, Ind., on April 15. With the opening of this new unit, all business formerly handled by the key warehouse in Chicago will be transferred and that operation will be closed. Thermoid's customers in the Central and Midwest trading areas, formerly served from Chicago, will be served more readily from the new warehouse operating in a non-congested area. Shipping from the new warehouse will be largely by truck and will permit door-to-door shipments to the larger cities, an advantage not possible from the congested Chicago location. Completely modern throughout, and of stone construction, the Wabash warehouse will make it possible for Thermoid more efficiently to handle its growing volume of business in the automotive, industrial, and oilfield markets of the Midwest. Space provided totals 90,000 square feet as compared to the former 25,000 at Chicago. The new warehouse will be operated by a staff of 18, under the direction of H. L. Conover, who will go to Wabash from the main office in Trenton.

Thermoid has appointed Henry E. Holden and Louis Benton original equipment sales engineers for industrial friction material. Mr. Holden will operate in the Michigan and Ohio area with headquarters at 17850 Cannon Ave., Cleveland; while Mr. Benton will have charge of the Indiana, Illinois, and Wisconsin area, and his headquarters will be at Thermoid's Chicago office. Mr. Holden joined Thermoid on February 15, 1947, coming from Warner Electric Brake Co. Previous to that he had been engaged in field application of friction materials. Mr. Benton came to Thermoid directly from the U. S. Navy, having served as a lieutenant, a year ago and recently completed his course at the Thermoid training school.

Edgar A. Rogers, Chattanooga Bank Bldg., Chattanooga, Tenn., has announced the association with him of Chester A. Roush, Jr., a chemical engineering graduate of Georgia Tech who served for more than three years as lieutenant in submarines, U. S. Navy. Mr. Rogers' long-established business is the analysis of process plant requirements and the application of equipment specifically engineered to meet special as well as ordinarily encountered operation conditions. Mr. Rogers, a mechanical engineer, represents Mixing Equipment Co., Merrick Scale Mfg. Co., LaBour Co., Process Equipment Division of Lapp Insulator Co., Foster Engineering Co., Pennsylvania Pump & Compressor Co., Thermix Co., Black, Sivalls & Bryson, and the Helicoid Gage Division of American Chain & Cable Co., Inc.

Hercules Powder Co., Wilmington, Del., has established for the first time, a synthetics department sales office in St. Louis, Mo., which, with the company's naval stores department office, was opened May 5 at 3615 Olive St., St. Louis 1. The naval stores office was formerly at 611 Olive St. Jordan P. Synder becomes technical sales representative for the synthetics department in the St. Louis office, which will operate as a sub-office under Paul Lefebvre, district manager in Chicago, where Mr. Synder had been stationed the past two years, covering St. Louis. The naval stores representative is Joseph M. Carbonara, a member of the department's sales division since 1939 and assigned to St. Louis in February.

Hewitt Rubber Division of Hewitt-Robbins, Inc., Buffalo, N. Y., has appointed Thomas D. Owler to handle sales of Restfoam, the company's foam rubber cushioning material, in the New England territory. Mr. Owler has had long experience in the seating and furniture trades, having held engineering, production, and sales positions with Heywood-Wakefield, S. Karpen & Brothers, and the Coach & Car Equipment Corp.

Hewitt has also appointed Quaker Products Co., 146 N. 10th St., Philadelphia, Pa., to distribute Restfoam throughout eastern Pennsylvania, Maryland, Delaware, and the District of Columbia. Quaker Products, operated by Herbert M. Weiner and Milton Schwartz, will supply foam rubber cushioning for a wide variety of uses such as hospital mattresses and sick-room supplies, furniture upholstering and bedding. A full line of Restfoam products is displayed in the company's new showroom in Philadelphia. Besides the sale of Restfoam for new equipment, Quaker will also distribute slab and cored stock for replacement purposes.

Another distributer appointed by Hewitt is Bellows & Co., Honolulu, to handle Restfoam sales in the Hawaiian Islands. The company, which imports a wide line of products was organized in 1941 by Frank Bellows.

I. B. Kleinert Rubber Co., 485 Fifth Ave., New York 17, N. Y., at its annual stockholders' meeting on April 10 elected as vice president Paul R. McCampbell, manager of the company's factories in College Point, L. I. Mr. McCampbell, who came to Kleinert from the United States Rubber Co. in 1924 as assistant chemist, won many promotions and became a director of the company in 1941. A native of the Midwest, the new vice president was educated at Wabash University.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., through Warren A. Beh, director of sales of the nylon division, has announced the creation of two new positions as assistant director of sales. George S. Demme, assistant director of sales, has been placed in charge of nylon yarn sales and technical service; while Frank H. Coker, assistant director of sales of the rayon division, joins the nylon division as assistant director of sales in charge of nylon yarn sales development and promotion.

R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa., has appointed Samuel R. Rhoads manager of its hydraulic machinery division. Mr. Rhoads has been associated with Florence Pipe Foundry & Machine Co., the parent organization, and R. D. Wood Co. since 1926, entering their employ as a hydraulic machinery designer. From 1930 to 1938 he was chief designing engineer in charge of hydraulic machinery and hydraulic valve design, then he was transferred in 1938 to the sales and engineering department in the Philadelphia office.

Sun Chemical Corp., 100 Sixth Ave., New York 13, N. Y., has acquired Electro-Technical Products, Inc., manufacturer of bottle cap liners, rubber separator cloth, and electrical insulation, with plants in Nutley, N. J., and Los Angeles, Calif. This business will operate as a division of Sun Chemical, under Robert S. Robe as president.

OHIO

General Tire Elections

Meeting for the first time in the company's new conference hall, atop the office wing of the company's Akron plant, The General Tire & Rubber Co. shareholders recently unanimously reelected their directorate. At the directors' meeting following this thirty-first shareholder session, W. O'Neil, president, and all other officers were reelected to direct the company in what has been forecast as the "greatest year sales-wise in the history of the company." Other officers reelected were: C. J. Jahant, L. A. McQueen, S. S. Poor, D. A. Kimball, and C. F. O'Neil, vice presidents; W. E. Fouse, vice president and treasurer; and Hayes R. Jenkins, secretary; F. W. Knowlton, assistant secretary; and T. S. Clark, assistant treasurer.

The directors reelected in addition to Mr. O'Neil were: Messrs. Jahant, McQueen, Fouse, Poor, and Jenkins, C. F. O'Neil, R. Iredell, Joseph R. Kraus, and Howard W. Jordan. W. O'Neil is also chairman.

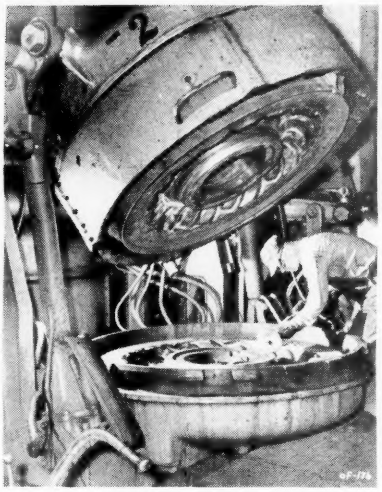
Mr. O'Neil announced that A. W. Phillips has been named general manufacturing manager for all plants of the company, its subsidiaries, and affiliates. He will direct the execution of company policies pertaining to manufacturing, engineering, personnel, and industrial relations.

General enjoyed its greatest year in history, sales hitting $105,883,559.25, it was pointed out by Mr. Fouse, who was cofounder of the company with Mr. O'Neil in 1915.

Power Brushing for Tire Molds

The Osborn Mfg. Co., Cleveland, recently completed a survey which reveals that power brushing is being utilized in many ways in the tire industry. One of its most important applications is made in the tire mold-cleaning operations at the Firestone Tire & Rubber Co. plants. The task of cleaning watch-case tire molds by any other method would necessitate removal of the molds from the press and would therefore be costly. At Firestone, cleaning of the larger agricultural equipment and tractor tire molds is accomplished within a few minutes by a simple and comparatively inexpensive process. The larger molds are first "burned" with an oxygen torch, when necessary, to soften up the hard particles of rubber that cling to the deep and sharp tread design crevices. The molds for the smaller standard-size tires are merely brushed once during each shift. A seven-inch Osborn wire brushing wheel, composed of three sections to the set, and mounted on a 3,000 r.p.m. portable air tool, is used to clean thoroughly and prepare the mold for the next curing operation. The time of operation varies with the size and type of mold, but in no instance takes more than a few minutes. All of Firestone's tire molds are cleaned by this brushing process, and company officials say that this method also permits longer mold life by conditioning the metal surfaces and gives tires with smoother and more glossy surfaces.

Power brushing is used extensively in the cleaning of fabric liners, with Tampico fiber rotary brushes being used for this operation. Power brushing is also used in Firestone's equipment maintenance program and for preventing fire hazards. For example, in the latex storage building, an eight-inch bronze sparkproof Osborn wire brush is used for cleaning empty drums. These steel drums, after steam-pressure cleaning, are flushed and brushed with the sparkproof brush and a solvent. The company has found this method to be the only satisfactory way to clean the drums and, at the same time, prolong their life by keeping them free of scale and rust.



Power-Driven Osborn Wire Brushes Used by Firestone for Cleaning Tire Molds

Goodrich Advances Stevens

Amos D. Moss, director of purchases for The B. F. Goodrich Co., Akron, since 1920 and a member of the organization since 1899, will retire on July 1. He will be succeeded by E. A. Stevens, assistant to the director of purchases since April, 1942, and with the company since 1928.

Mr. Moss, dean of purchasing directors in the rubber industry, joined Goodrich as a clerk in the billing department 48 years ago. During his long career with the company he has served in many production and office divisions including timekeeping, industrial products, golf ball and hard rubber manufacture, becoming director of production control in 1918. Two years later he was appointed director of purchases. He is a native of Iowa, where he was educated. Mr. Moss is also a member of the New York cotton and commodities exchanges and was for many years a director of Goodrich (SS) Ltd., Singapore.

Mr. Stevens entered the employ of the rubber company shortly after his graduation from Sheffield Scientific School of Yale University as chemical engineer in 1928. He was first assigned to the company's processing division, was for a short period in the general chemical laboratories, and in 1929 became a member of the raw materials department where he began his work with crude rubber. He transferred to the purchasing division in 1930 as crude rubber buyer and joined the company's crude rubber buying staff in Singapore in 1933, returning to the United States in 1936. Then in 1940 he became managing director of the Goodrich rubber buying subsidiary in the Far East and remained there until the last American rubber carrying boat left Singapore in January, 1942.

Appointment of a field architect for each of the five territorial divisions of the replacement tire sales division at Goodrich was announced by James A. Holland, manager of store design and engineering. A. G. Nosek, Jr., has been assigned to the central division, headquarters Akron; T. A. Durbin, eastern division, headquarters Akron; R. R. Young, Pacific division, headquarters Los Angeles, Calif.; R. F. Geisler, southeastern division, headquarters Atlanta, Ga.; and George D. Van Nort, southwestern division, headquarters Kansas City, Mo. The five architects will assist divisional and district staffs in their areas on problems of dealers and stores on improving salesrooms, rearrangement of store layouts, merchandise display, lighting, and other aspects of design.

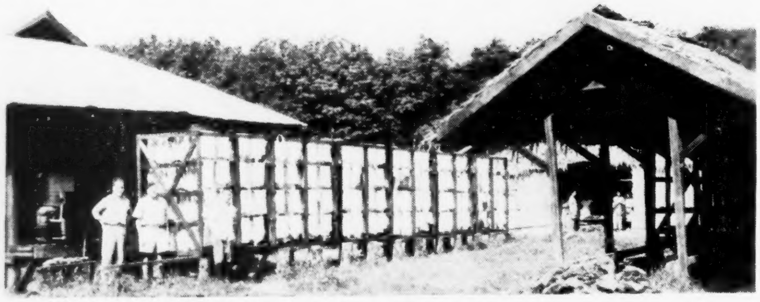
David M. Goodrich, chairman of the Goodrich company, on April 18 was reelected a board member of National Industrial Conference Board, Inc.

The Goodrich tire and tube manufacturing plant at Oaks, Pa., observed the tenth anniversary of continuous operations in April by producing the 16,000,000th tire there. During the ten-year period the payroll at Oaks has increased from slightly more than $300,000 the first year to nearly $3,250,000 estimated for 1947. The plant has been enlarged three times since 1938, each expansion costing in excess of a million dollars. A construction program is currently under way there to increase facilities again at a cost of more than $1,600,000.

Goodrich operates other tire and tube plants at Akron, Los Angeles, Calif., Miami, Okla., and Tuscaloosa, Ala.

The development and production of an all-purpose, four-passenger boat designed to provide maximum safety and to roll up into a bundle hardly larger than the average suitcase has been announced by Goodrich. Embodying the same principles as the battle-tested rubber life raft, the boat has a flat bottom which makes it almost impossible to upset. In designing the boat, company engineers placed special emphasis on compactness, portability, and seaworthiness, providing a greater range of adaptability and uses than the conventional-type rowboat. Other features of the 50-pound craft include aluminum oars which will float; a fast-action military pump which will inflate the boat in a few minutes; provision for an outboard motor; two compartments, fore and aft, separated by bulkheads; and quick, easy assembly. Designed to withstand rough usage, the boat is of heavy cotton duck coated inside and out with an oil-resisting rubber compound.

An all-time high of more than $100,000,000 worth of tractor tires and tubes will be bought by America's farmers this year, according to J. A. Hoban, Goodrich merchandise manager. Speaking before the National Farm Chemurgic Council, Mr. Hoban said that since the end of the war the dollar volume of tractor tire business has been "more than seven times what it was in 1941." Rubber tires on farm equipment can save a farmer 24 working days and 675 gallons of fuel yearly for each 150 acres worked, according to exhaustive tests made to determine the improvement in farm vehicle performance when rolling on rubber, the speaker further declared. He also noted that more than 34% of the nation's total of trucks are engaged in agriculture. Among the more notable modern uses of rubber on the farm, aside from tires, are milking-machine inflations and tubes, electric brooder blankets, and conveyer belts used both inside barns for waste disposal and outside for loading grain or hay.



Milled Sheet Rubber at Goodyear's Pathfinder Plantation in Philippines Ready for Drying in the Smoke House

Goodyear Executive Changes; New Products Developed

Appointment of H. J. Young to the post of general auditor for The Goodyear Tire & Rubber Co., Akron, heads the list of four personnel changes in the firm's financial division. Placed in charge of all domestic wholesale and retail field operating is J. E. Caldwell, assistant comptroller. Also assigned to the field operating department is W. D. Henderson, replaced as manager of the general auditing department by C. E. Jordon.

Mr. Young joined Goodyear as a cost clerk in May, 1912. Five years later he was named supervisor of the production cost division and in 1918 was elevated to manager of the cost department; in 1926 he was assigned to the California plant as comptroller, returning to Akron as assistant comptroller in 1936. A native of Turtle Creek, Pa., he attended Ohio Northern University.

Mr. Caldwell started as assistant comptroller at Goodyear Aircraft Corp. in August, 1941, being transferred to a similar position at the parent company early in 1947. A native of Springfield, Ill., he attended Northwestern University. He has had wide experience in the field of finance, having been associated with several companies in accounting and consulting capacities. He is a certified public accountant in Illinois and New York.

C. E. Jordon is a graduate of Goodyear's flying squadron. Following graduation in 1926, he was assigned to accounting in the export division. Assignments in India and Puerto Rico preceded his service as auditor in Birmingham and Cincinnati. During the war he was works accountant at the company's powder bag loading plant in Charlestown, Ind., returning to Akron in January, 1946, as a member of the comptroller's staff. Native of Chattanooga, Tenn., he went to the University of Alabama.

Mr. Henderson started with the company's Columbus district office as a clerk in 1929. He served in numerous auditing positions in Birmingham, Nashville, Jacksonville, and Philadelphia. Previous to his present appointments he worked as a staff auditor in Akron. Born in Newark, O., he attended Ohio State University.

Robert D. Juve, has been appointed synthetic rubber coordinator for Goodyear. His duties include the coordination of research, development, and end-use activities related to various synthetic rubbers. Native of Akron, Mr. Juve is a graduate of Buchtel High School and Purdue University, where he majored in chemical engineering. He started with Goodyear in July, 1939, at Jackson, Mich., transferring to Akron a year later. In August, 1940, he was named an assistant physical chemist and in 1943 became a senior research chemist. For two years during the war he was assigned to special duties with the Technical Industrial Intelligence Committee of the Foreign Economic Administration.

Appointed assistant manager of brake lining sales was Paul C. Kenyon. K. D. Kienth was named to a similar position in battery sales. Both men report to John H. Mess, newly appointed manager of battery and brake lining sales.

Native of Milwaukee, Wis., Mr. Kienth joined Goodyear following his graduation from the University of Kansas in 1927. He served in production control for a year, later transferring to various sales positions in Cincinnati, Columbus, and Buffalo. A veteran of World War II, he served as staff man in the company's dealer department, Akron, prior to his present appointment.

Mr. Kenyon came to the company as staff man on brake lining and storage batteries in August, 1945. He had previously held brake lining sales positions with other rubber manufacturers. For developing improved bonding equipment used in relining automobile brakes, Mr. Kenyon received an award of $1,500 from the company's suggestion department. He is a native of Gilmanton, Wis.

John W. Bear has been added to the staff of the plastics and coatings department and assigned to the Philadelphia district. Mr. Bear, a native of Logansport, Ind., and formerly affiliated with the Carnegie-Illinois Steel, Gary, Ind., as a chemist, joins the Goodyear organization after extended war duty with the Navy. He will handle sales contacts in the Philadelphia district for such products as Pliolites, Chemigums, and paper coatings and will report to H. R. Thies, department manager at Akron.

E. J. Thomas, president of Goodyear, was one of the group of 15 of the nation's industrial leaders who flew to Germany late in April to spend about three weeks in making a special survey of the industrial and export problems of the combined American-British zones. Secretary of War Robert W. Patterson, who selected the group, stated that American business leaders can contribute invaluable technical guidance to General Clay in establishing an economically self-sufficient Germany. This program will take three years, Mr. Patterson said, and involves $1\frac{1}{2}$ billion dollars, which the United States and Great Britain must be prepared to spend on Germany through the year 1949. It is with respect to the long range implications of this program that the industrial survey is being made. According to Mr. Patterson, the group will have every opportunity to examine all aspects of manufacture and export in western Germany. Production there is now at 44% of the prewar 1936 level, an encouraging figure considering the most severe winter just passed.

The Goodyear Pathfinder rubber plantation in the Philippines has now reached peak production capacity, less than two years after the Japanese were driven out of Mindanao, company officials have announced. Aided by the absence of tapping for four years and the added maturity of the trees, a record yield of 1,000 pounds per acre is anticipated this year from the plantation, located at Kabasalan, 60 miles northeast of Zamboanga on Sibuguey Bay. Work of reclaiming the plantation was started in July, 1945, but the area was not fully in tap until May, 1946. Factory facilities had been partially destroyed, with some buildings completely burned and a considerable amount of equipment looted. Army surplus materials have helped out in the rehabilitation work, and now trucks and jeeps with trailers haul latex and smoked sheets in competition with the ancient form of Carabao powered narrow-gage railroad. The plantation, restricted by Philippine law to 2,420 acres, has 2,371 acres in full production. The anticipated yield of 1,000 pounds per acre is more than twice that turned out by the average Malayan estate before the war.

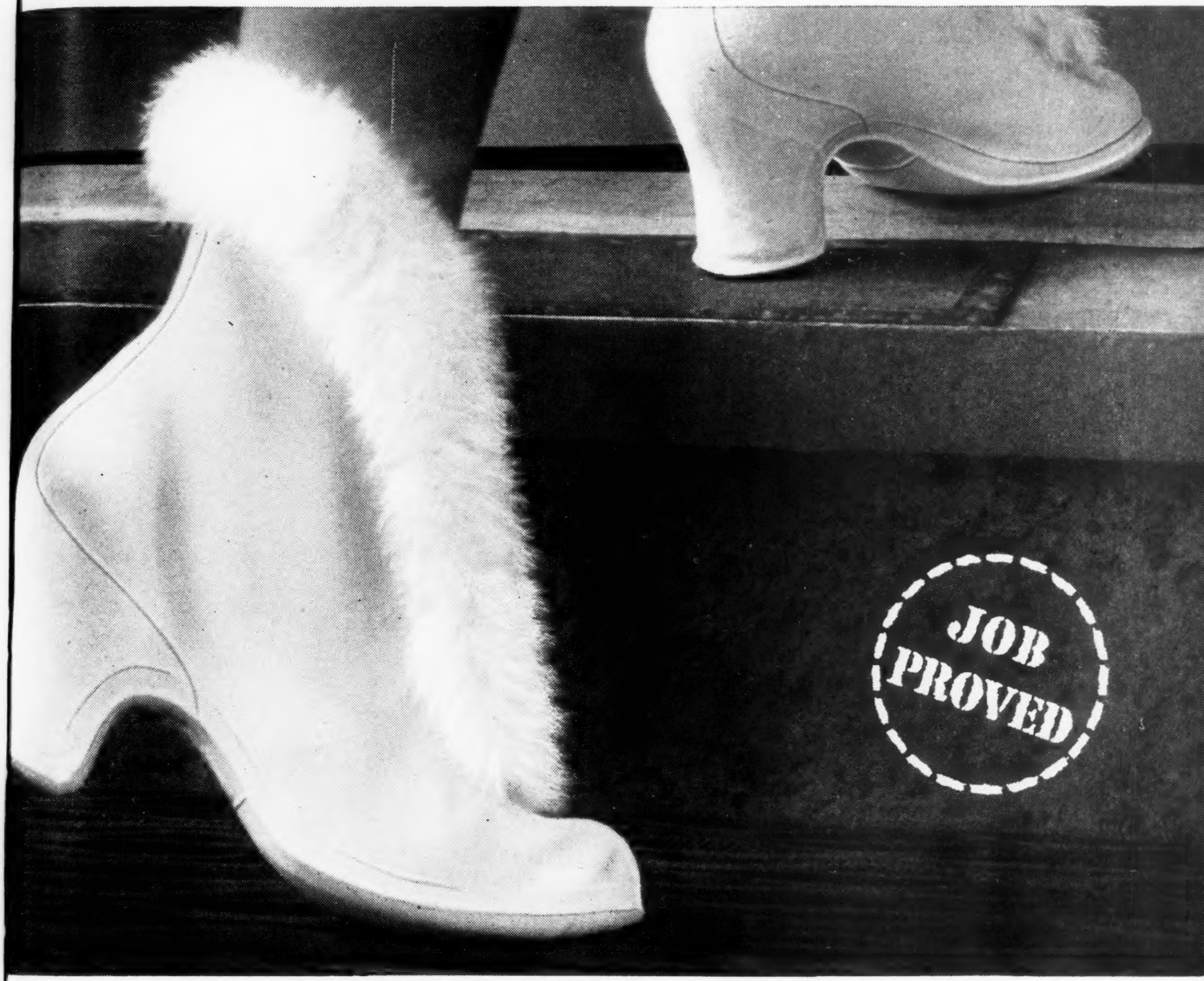
The Pathfinder plantation represents only a fraction of Goodyear's rubber-growing developments in the Far East. Nearly 55,000 acres had been planted in Sumatra, out of a total of 87,000 acres leased, when the Japs invaded the island. To date no company survey party has been able to enter Sumatra to determine the present status of the Wingfoot and Dolok Merangir plantations. Goodyear's Speedway estate in Costa Rica, consisting of 2,466 acres, starts producing for the first time this year. The trees are of a high yielding strain designed to resist leaf blight which has retarded rubber growing in Central American countries.

Pliofilm Developments; New Tires

A non-fogging Pliofilm for the packaging of fruits, vegetables, and other foodstuffs was recently announced by the Goodyear Research laboratory in Akron. Water vapor previously had a tendency to form tiny droplets inside the package, creating a fog or film of moisture on the inside of the Pliofilm wrapping which rendered it opaque. According to L. B. Sebrell, laboratory director, a non-fogging Pliofilm has been achieved by the addition of modifiers which act as wetting agents. These cause a "wetting out" action. The moisture, instead of gathering in droplets, is dispersed into a continuous layer on the inside of the Pilofilm, through which it is absorbed and transmitted to the atmosphere. As a result, the wrapping remains transparent.

Oranges from Florida's Indian River Valley this year are moving to market in limited quantities in a "second skin" of Pilofilm which preserves their freshness and reduces weight loss and spoilage. The Pliofilm layer is applied to the fruit by a machine designed and built for the Curtiss Candy Co. by Williams S. Cloud, Chicago engineer, which is capable of processing as many as 800 oranges per minute. The cost on a volume production basis is estimated at about 0.1¢ per orange, comparable to the cost of applying the non-functional paper wraps now being used. The machine is now in operation at the Oak Hill Cooperative Fruit Packing house, and market studies have shown the fruit so wrapped to have excellent acceptance in both wholesale and retail out-

Step Up Your Sales



SUN RUBBER PROCESSING AIDS...

Mean Clear, Clean Colors . . . Without Blooming . . . Without Discoloration

Color is America's No. 1 salesman. It makes customers stop and look. It often makes the difference between a product that people will buy and one that they will pass by.

If you manufacture rubber goods in white or pastel shades and are bothered with "blooming" or discoloration, have a talk with your nearest Sun Engineer. Sun makes several different rubber processing aids for natural, neoprene, reclaimed and GR-S synthetic rubbers. Sun processing aids are widely used and have been "Job Proved" in scores of major plants.

Sun Rubber Processing Aids are highly compatible with the different rubbers for which they are recommended. They prevent "blooming" and discoloration. They make possible more attractive, longer-lasting colors. They speed up milling and aid plasticization..

To step up sales with clearer, brighter colors . . . to cut down manufacturing costs . . . call your nearest Sun office. Or write Department RW5.

SUN
SUNOCO
INDUSTRIAL PRODUCTS

SUN OIL COMPANY · ***Philadelphia 3, Pa.***

lets. Similar machines, Mr. Cloud said, can be built for the wrapping of other fruits, such as tangerines, grapefruit, mangoes, avocadoes, and papayas, and can be adapted for use with vegetables.

An odorless and non-refrigerated method of shipping shrimp and other highly perishable seafoods by rail express to remote points where air service is not available was demonstrated by Goodyear at the annual packaging exposition of the American Management Association in Philadelphia, Pa., on April 9. Using moisture— and odor-proof Pliofilm as a liner to prevent seepage, and standard Hinde & Dauch Insulpaks, insulated at top and bottom and between the sides with light-corrugated board, Goodyear in cooperation with Ralph Duncan, Biloxi, Miss., seafood processor and shipper, displayed shrimp in top-quality condition after having been in transit for almost 40 hours without any type of refrigeration. The shrimp is chilled to 32° F. before packing in the Pliofilm-lined carton, and the bag and boxes are sealed, completely locking in the shrimp from the outside air. Recent test shipments which were in transit for 50 hours, between Biloxi and Goodyear's Akron laboratories, showed a temperature rise inside the boxes of less than 10 degrees.

A new development in food packaging which permits two foods of separate and distinct flavors to be packed in the same can without blending was also shown at the packaging show. The method consists of introducing a sauce-filled Pliofilm sack into the can of meat or other food product. For use in the kitchen, the separately opened Sack-O-Sauce is poured over the contents of the can before heating and serving. The first product introduced to the public is a can of wieners produced by Oscar Mayer & Co., Madison, Wis., which contains seven full-size wieners and a Pliofilm sack of barbecue sauce. The company plans to market a number of other foods packed with various sauces in these sacks.

Another innovation is the use of Pliofilm for wrapping potted plants. This was introduced at the packaging show by Paul Phypers, Florida horticulturist, who said the Pliofilm protects the blooms in shipment and handling, makes an attractive package, and at the same time permits the plants to breathe and retain their full natural colors. Mr. Phypers stated that he expects to ship as many as 20,000 blooms a day to northern markets, having installed a high-speed Pliofilm-overwrap machine for this purpose.

A new premium truck tire with all plies constructed of newly perfected nylon cords developed expressly for rugged service has been announced by Goodyear. The new tire, stated to be the first all-nylon truck tire introduced to the market, makes available to operators the greatest strength, resistance to bruising, and resistance to heat factors ever incorporated into cord truck tires, the company claims. Goodyear tire engineers have calculated that a 12-ply rating all-nylon truck tire carcass has 50% greater strength than a comparable tire constructed of the best rayon tire cords yet developed. In addition, the all-nylon tire is lighter, more flexible, develops less heat in high speed operation, and greatly improves bruise resistance under roughest operating conditions. According to R. P. Dinsmore, vice president in charge of research and development, the new tire was made possible by development in the company's research laboratories of a pre-stretching technique for nylon cord which reduces the tendency of nylon to "grow" or "stretch" in service, a problem that delayed application of nylon to truck tire use. Another factor was development of an adhesive which makes possible perfect bonding between the nylon cords and the rubber. The Hi-Miler Extra Tred tire is the first in the Goodyear line to incorporate all-nylon construction in plies and cushion. Because of current limited supplies of nylon tire cord, the production of all-nylon tires will be on a limited basis.

A new premium bicycle tire designed for postwar bicyclists and motorbike operators who demand the finest in tire equipment was recently announced by Goodyear as the latest addition to its bicycle tire line. Known as the "Double Eagle Airwheel," the tire is the postwar version of the prewar premium bicycle tire of the same name. Constructed with two plies of patented supertwist cord, the same as is used in Goodyear DeLuxe automobile tires, the carcass of the new tire is 100% stronger than the conventional bicycle casing, according to M. F. Moyer, manager of the company's cycle tire department, who stated that the two special plies provide an overlap feature equivalent to an extra ply directly under the tread where the wear is greatest. The rapidly mounting popularity of motorbikes has created a substantial demand for a stronger tire to accommodate the added weight of these vehicles, Mr. Moyer explained, but the new tire will also give far greater wear and riding comfort to all bicyclists. Other special features of the tire include a thicker, heavier tread with a deeper non-skid design which insures maximum protection against cuts, bruises, and blowouts resulting from fast stops and starts, and higher rolling speeds.

Seiberling Election

L. M. Seiberling, sales manager of Seiberling Rubber Co., Akron, O., was elected a director of the company at the recent meeting of stockholders, succeeding his father, the late C. W. Seiberling. All other directors were reelected including: E. A. Seiberling, J. P. Seiberling, H. P. Schrank, J. L. Cochrun, R. J. Thomas, A. C. Blinn, and Robert Guinther.

W. H. Oburn, the company's credit manager, was elected assistant treasurer at a directors' organization meeting following the stockholders' session. Mr. Oburn has been with Seiberling since its founding in 1921.

Present officers of the company were reelected at the organization meeting. The full list follows: F. A. Seiberling, chairman of the board; J. P. Seiberling, president; H. P. Schrank, vice president in charge of production; J. L. Cochrun, vice president in charge of sales; Richard J. Thomas, vice president and treasurer; C. E. Jones, vice president and comptroller; W. P. Seiberling, secretary; H. E. Thomas, assistant secretary and assistant treasurer; J. W. Dessecker, assistant secretary; W. H. Oburn, assistant treasurer.

F. A. and J. P. Seiberling and A. C. Blinn continue as executive committee.

Pharis Tire & Rubber Co., Newark, in its recent statement to stockholders reported that its Molded Materials Division, which manufactures brake lining in Ridgway, Pa., finding its leased factory inadequate for its expanding business, purchased the building, and plans are now complete for expansion of these facilities.

Adamson United Co., Akron, has appointed A. J. Baldwin, New York representative at 441 Lexington Ave. Mr. Baldwin was graduated from the University of Illinois with a degree of B.S. in engineering. He began his plastics career at the National Carbon Co., Cleveland, where he went through an approved training program to acquaint himself with the production and research problems of Vinylite resins. After this training program, Mr. Baldwin became production supervisor in the company's pilot plant, producing Vinyl sheets, films, sheetings, and molding compounds. In December 1941, however, he was transferred to the Bakelite Corp., Bound Brook, N. J., as a production supervisor to help start the first plant built by Union Carbide & Carbon Co., to produce Vinyl films, sheetings, etc. on a large-scale or production basis. Two years later Mr. Baldwin was made head of the production engineering department, which position consisted of controlling production costs, time study, the development of new processes and equipment, maintenance of equipment, and acting as liaison officer between the production department and the general engineering department. In the last quarter of 1945 he was relieved of production responsibilities and assigned to the project of designing the new Bakelite plant in Ottawa, Ill. In this capacity Mr. Baldwin acted as coordinator between the production department and general engineering department.

The Buckeye Shim & Gasket Co., formerly in East Liverpool, is now located in the Akron district, at 307 Monroe Falls Ave., Cuyahoga Falls. In a well-equipped plant the company is engaged in making a variety of rubber plant machinery, including specialized equipment for retreading passenger and truck tires. The company is headed by John R. Stricklen and Samuel Fraine, both formerly executives of National Rubber Machinery Co., Akron, in the sales and engineering departments, respectively.

NEW ENGLAND

Prufcoat Laboratories, Inc., Cambridge, Mass., has appointed United States Rubber Export Co., Ltd., exclusive export distributer for Prufcoat protective coatings and Pruftite transparent waterproofing. Performance-proved during the past eight years in critical corrosion problems, Prufcoat protective coatings are synthetic resin formulations applied like paints to masonry, metal, and wood to provide positive protection against acids, alkalies, alcohol, oil, water, and flame. Pruftite transparent waterproofing is claimed to be the first chemically-correct liquid waterproofing material for masonry surfaces. It is said to provide an inert, non-oxidizing, completely waterproof and alkali-proof film which is firmly bonded within the masonry pores, capillaries and hairline cracks.

Walter H. Bieringer, vice president of Plymouth Rubber Co., Canton, Mass., last month was elected president of the Urban League of Greater Boston.

MacLean Made Export Manager

Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed D. K. MacLean export manager for all lines of machinery manufactured by the company's four plants. He will make his headquarters at the main office at Ansonia and will also continue his duties as manager of the sugar mill machinery sales department, a post he has held since 1929.

Mr. MacLean started in the Farrel engineering department in 1909, and remained with the company ever since except for a period of service in the U.S. Army during World War I. Since 1919 he has been in sales engineering work and from 1924 to 1929 was manager of the company's office in Havana, Cuba. During World War II, Mr. MacLean acted in a liaison capacity between Farrel-Birmingham and the WPB Rubber Division; he was also a member of the WPB Industry Advisory Committee on sugar machinery and equipment.

Honors Veteran Employes

Two employes of Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass., were honored recently for their service with the company. The occasion was a dinner at the home of Godfrey L. Cabot, given for J. S. Kennedy, company comptroller, and Carl L. Gyberg, of the land department. Mr. Kennedy had just rounded out 25 years with Mr. Cabot, and Mr. Gyberg 33.

Mr. Cabot invited to the party all employes with the company at least ten years. Twenty-seven of the 29 veterans in Boston were present, including: R. G. Allen and Ralph Bradley, vice presidents; Owen J. Brown, Jr., general sales manager; Fred C. Fernald, head of the Cabot legal department and secretary of the company; Fred H. Amon, technical director; D. D. Cochrane, chief engineer; Walter R. Smith, chief research chemist; and B. A. Wilkes, of Cabot technical sales and service.

Both Mr. Kennedy and Mr. Gyberg were full of reminiscences of the early days of the Cabot company, when the Boston office comprised but few persons. The staff has increased enormously since then, and the manufacturing force which produces carbon black and other Cabot raw materials has been enlarged many times.

"Company operations 25 years ago were all contained in West Virginia where the company which later became Godfrey L. Cabot, Inc., produced natural gas and manufactured carbon black," Mr. Kennedy said. "I have seen the company, either by itself or through subsidiaries, extend its operations from West Virginia to New York, Pennsylvania, Texas, Oklahoma, Louisiana, Montana, and Florida.

"In the early days the two plants were at Glasgow and Spencer, W. Va. The carbon blacks we made then were Auk, Kalista and PX Elf. We still have those grades, but, of course, many more have been added.

"Mr. Cabot, then as now, was the active head of the company, even for a period during World War I, when he and his sons were in the armed forces."

Mr. Kennedy took charge of Cabot accounts in March, 1922, as auditor. Two years ago the directorate made him comptroller of Godfrey L. Cabot, Inc., Cabot Carbon Co., and its Retort Chemical Division, and Cabot Shops, Inc., and he now holds the same position in the General Atlas Carbon Co.

J. S. Kennedy

Mr. Kennedy received his B.C.S. at Northeastern University in 1915 and became a Certified Public Accountant in 1928. Before joining Cabot he spent several years in Europe and the Middle East as an auditor for the Gillette Razor Co.

B. E. Dougherty, head of The B. E. Dougherty Co., agent in the Los Angeles, Calif., area for Godfrey L. Cabot, Inc., was in Boston recently for conferences with Owen J. Brown, Jr.

General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass., has appointed George D. Kratz sales representative in the Philadelphia area, covering eastern Pennsylvania, southern New Jersey, Maryland, and Delaware. A graduate of Cornell University, Dr. Kratz has had many years of experience in the tire industry, as well as five years of general consultant work in latex and rubber. He was sales representative for General Latex for the eight years preceding the war. In 1942 he joined the United States Department of Agriculture in charge of a group working on the extraction of latex from guayule, *Cryptostegia*, and *Kok-saghyz*. Later in the war he was active in the GR-S latex program for the production department of Rubber Reserve. Dr. Kratz was appointed vice president in charge of research of the Norwalk Tire & Rubber Co. in 1944, which position he resigned on April 1 to rejoin General Latex.

Carr Mfg. Co., Bristol, R. I., recently appointed E. E. Zeilstra chief chemist. Mr. Zeilstra was graduated from Calvin College with a B.Ch.E. degree in 1934. Then he found employment, which lasted until 1942, with the Ford Motor Co., where, as assistant to J. H. Doering, chief rubber chemist, his duties at the tire plant covered compounding, setting up a control system for machinery, supervising crude rubber inspection, and acting as technical supervisor of the Banbury line and miscellaneous goods department. From 1943 through 1945, Mr. Zeilstra was chief rubber chemist at John A. Roebling's Sons Co., where he was in charge of all compounding and shop process development and installed and supervised the insulated wire laboratory. His next position was as Midwest representative, with headquarters in Akron, for Wilmington Chemical Corp. Then, for a while, before joining Carr, Mr. Zeilstra did consulting work.

MIDWEST

Monsanto Personnel Changes

Monsanto Chemical Co., St. Louis, Mo., last month announced the following changes among its executive personnel.

Melvin E. Iten has been appointed freight traffic manager, and Harold T. Hale passenger traffic manager. Mr. Iten, with Monsanto since 1944, formerly was with the St. Louis-San Francisco Railroad. During the early years of the late war he served with the Weldon Spring Ordnance Works, operated by the Atlas Powder Co.

Mr. Hale formerly was city passenger agent at St. Louis for the Chesapeake & Ohio Railroad. He also has been affiliated with the Nickel Plate and Missouri Pacific railroads.

Robert A. Ruehrwein has been promoted research group leader in the central research department at Dayton, O., to be in charge of physical chemistry research group. Dr. Ruehrwein joined Monsanto in 1943 and participated in the rocket propellant project at the central research department's Unit II. At the termination of the war, he was transferred to Unit I of Monsanto's central research department, where he has been engaged in the application of physical chemical methods to basic studies. Dr. Ruehrwein studied at the universities of Montana and California, receiving the Ph.D. degree in chemistry from the latter institution in 1939.

Monsanto has opened a new plant in Springfield, Mass., for the manufacture of the textile-treating chemical known as Resloom. This chemical, a new type of melamine resin, imparts shrinkage control, muss resistance, and stability to woolens, rayons, cottons, and blends, it is claimed. The new plant which will have a yearly output capable of processing 50,000,000 yards of fabric, will be operated as a part of the company's plastics division, but the product will be marketed through Monsanto's textile chemicals department which has headquarters in Boston, Mass.

According to Donald H. Powers, director of Monsanto's textile chemical department, Resloom has until now been available only in limited quantities, mainly for trial runs and field tests. It has gained acceptance in 50 processing mills of various types, and thousands of garments have already been manufactured from Resloom-treated fabrics. The treated fabric is impregnated with Resloom, rather than surface coated, and the resin can be applied only in the processing mill, Dr. Powers explained.

Monsanto has opened a new sales office at 140 Federal St., Boston, Mass., to handle regional sales of organic chemicals, phosphates, alcohol and dry ice, and to serve as a divisional branch for the company's export sales and shipping department. The organic and phosphate sales staff in the new office will be headed by Thornton Jesdale, while Paul Huntington will have charge of alcohol and dry ice sales, and Robert E. Holmes will head the export sales and shipping department branch.

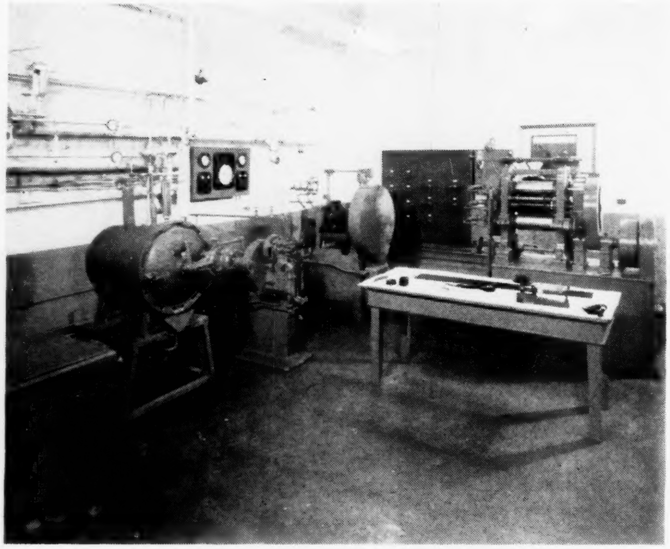
As an aftermath of the Texas City, Tex., disaster on April 16, which included the complete destruction of Monsanto's 16-million-dollar styrene plant, employes of the Monsanto organization expressed their reaction with donations and offers of help. The company's plants at Oak Ridge, Tenn., Trenton, Mich., Seattle, Wash., Anniston, Ala., and St. Louis, Mo., were the first

to notify the company's emergency headquarters at Galveston, Tex., that donations were either being taken up or being planned to aid fellow employes and their families who were victims of the tragedy. William M. Rand, company president, announced that effective April 19 all Monsanto plants, both foreign and domestic, would fly their flags at half-mast for 30 days in respect to the employes who perished in the disaster.

Improved Synthetic Rubber

Phillips Petroleum Co., Bartlesville, Okla., through Chairman Frank Phillips and president K. S. Adams, announced on April 1 that the extensive synthetic rubber activities of the company have culminated in a greatly improved butadiene-styrene synthetic rubber which, according to laboratory tests, appears equivalent to natural rubber in many important properties. Although the final answer will come only after grueling testing of tires from this new rubber, indications are that the hope for a synthetic rubber that will be equal to, or better than, natural rubber for all sizes of tires is near realization.

Although it has been recognized for some time that improvement in synthetic rubber is to be expected from manufacturing processes carried out at very low temperatures, practical attainment of that improvement has only recently been realized by the development of extremely rapid emulsion polymerization recipes for the production of rubber at such low temperatures.



View of Processing and Curing Room in Philblack Akron Laboratory, Showing (L. to R.) Lift Table for Four-Deck Platen Press, Open Steam Vulcanizer, Royle Extruder, Warm-Up Mill, and Calender

Philblack Laboratory Ready

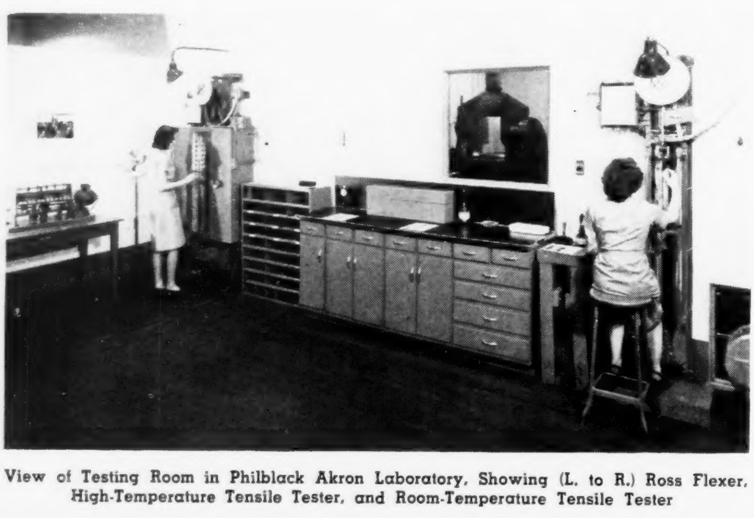
The Akron laboratory of the Philblack division of Phillips Petroleum Co. has started functioning and is now in a position to take care of all types of sales service requests. This technical service laboratory will also be used to accumulate and prepare data for future general releases. All long-range research is carried on by the company in the Phillips, Tex., laboratory.

In April, 1946, Phillips took over this laboratory which had been operated by Hycar Chemical Co. for its customers. Because the laboratory had been set up to handle only one type of product, considerable revision had to be made, and a great deal of additional equipment installed. The original equipment consisted mainly of milling, curing, and tensile testing machines, ovens, cold box, and oil bath. Ruring the past year Philblack has installed a Mooney plastometer, Goodrich flexometer, temperature and power recorders, De Mattia flexer, Bureau of Standards abrader, Angle abrader, Ross flexer, a high-temperature tensile tester, microscopes, and scales, and is now installing a laboratory Banbury. The laboratory is under the direction of L. G. Mason, who has a staff consisting of four technically trained men, five women equipment operators, and two male general helpers.

The Philblack division, on May 1, opened an office and supply depot in Providence, R. I., to serve a large section of New England, including the Boston district. The new offices are located in the building of the Lang Storage & Transfer Co., 389 Charles St., with John MacKay as manager.

Joseph E. Goldston, Process Equipment Division, Castalov Corp., 197 S. Waterman Ave., Detroit 17, Mich., has appointed Paul L. Reed, Ohio zone manager, with headquarters in Cleveland. Formerly editor of *Industrial Plastics*, he is chairman of the Cleveland Section, Society of Plastics Engineers. The Process Equipment Division recently introduced two new products—the Vacu-Therm generator, a Dowtherm low-pressure platen heater, and the plastic flow-melter.

Brunswick - Balke - Collender Co., Chicago, Ill., has advanced James FitzGerald to the position of assistant chief chemical engineer. Mr. FitzGerald has been employed at the company's Muskegon, Mich., plant in a research and development capacity for six years, largely in rubber, plastics, and finishes. He is a graduate of the University of Michigan and belongs to the American Chemical Society and the American Institute of Chemical Engineers.



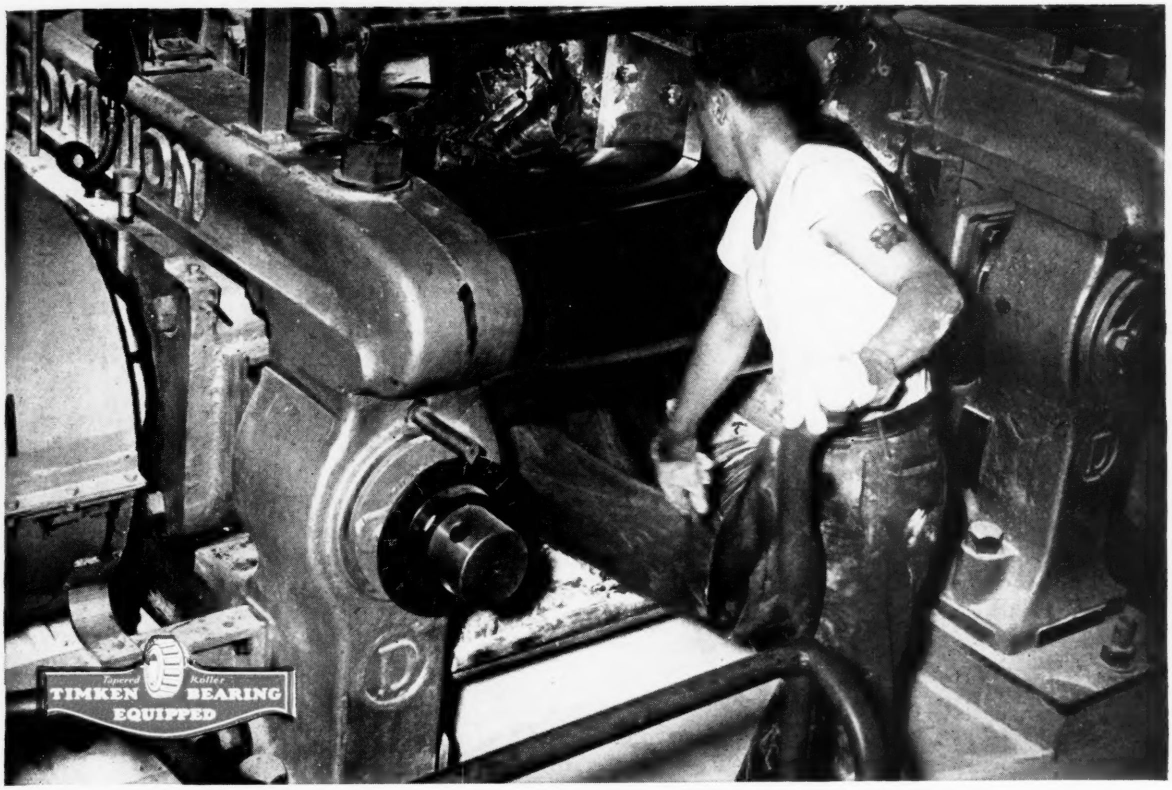
View of Testing Room in Philblack Akron Laboratory, Showing (L. to R.) Ross Flexer, High-Temperature Tensile Tester, and Room-Temperature Tensile Tester

CANADA

Voluntary Rubber Control

Motorists' hopes that the end of rubber control in Canada on April 1 would mean a speedy return to natural rubber tires were dashed when it was learned that Canadian rubber manufacturers have agreed to continue a voluntary form of allocation control for an indefinite period, administered through the Rubber Association of Canada. No immediate change in the natural rubber content of tires or other goods can therefore be expected, but there will be a gradual increase in percentage of crude as the supply situation eases.

Canadian companies have been purchasing crude rubber privately since January 1, 1947, and most firms report that they have not encountered much difficulty to date in obtaining rubber at the open market price. At present Canadian manufacturers are averaging 40% crude and



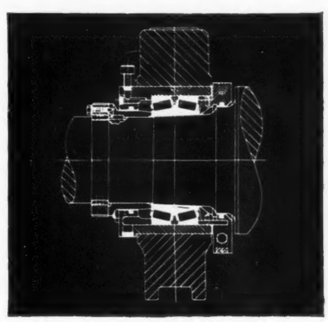
New Mills at Canadian Resins And Chemicals Limited Equipped with TIMKEN BEARINGS

The new "Vinylite" Plastic plant of Canadian Resins and Chemicals Limited, Shawinigan Falls, Quebec, affords a splendid example of the high technical and mechanical standards that have been attained in the production of plastics materials.

Timken Balanced Proportion Tapered Roller Bearings are applied on the roll necks of the Dominion compounding mills, providing increased roll neck strength and rigidity; minimum roll deflection; and maximum radial, thrust and combined load capacity. The rigidity of the mounting permits the incorporation of effective bearing housing seals, insuring positive lubrication and absolute cleanliness at all times — no oil leaks to spoil the material being milled. Timken Bearings also are used on the main drives of the mills.

Another and equally important advantage resulting from the use of Timken Bearings is greatly reduced mill maintenance — a point every plastics producer will appreciate.

Subsequent production processes are performed on Timken Bearing Equipped calenders and extruders. These machines will be featured in forthcoming advertisements. All equipment was designed and built by Dominion Engineering Works Limited, Montreal, Canada. The Timken Roller Bearing Company, Canton 6, Ohio.



Timken Bearing Application as used on the mill roll necks.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

60% synthetic rubber in total production. By the end of the year they hope to increase the percentage of crude to 55%, according to the Reconstruction and Supply Department at Ottawa. How soon this goal can be reached depends on availability of crude rubber, and if supplies increase more rapidly than now expected, the 55% mark may be increased this year.

Although government control of the use of crude rubber in Canada was removed on April 1, there has been no change in the natural rubber content of tires other than that made last December. At that time Ottawa permitted the crude rubber content of standard four-ply passenger-car tires to jump from 13 to 23%. Six-ply tires in popular sizes could use 33%, and larger-size passenger tires as much as two-thirds crude rubber. Large bus and truck tires are made almost entirely of natural rubber.

Improvements at Goodrich

A trip through the plant of B. F. Goodrich Co. of Canada, Ltd., at Kitchener, Ont., reveals that many changes have been made during the past six months. Departments have been moved into the new addition to the plant, and much modern equipment has been added. Starting near the Banburys, the first change noticed is an overhead conveyer carrying rubber from the mills to the new tubing machine. Extending nearly the entire length of the new building, the tubing machine is 200 feet long and has many new features which will improve and standardize the company's products. Three cooling tanks bring the rubber to a lower temperature than was possible before, making a better tread after molding.

On the second floor, where the bias cutters used to be, are two rows of new dome presses which allow greater flexibility in production scheduling. Feeding the dome presses is an overhead conveyer, a moving line of L-shaped saddle-type hooks carrying green tires (with water bags inside) to the presses, and then taking the cured tires over to the debagging area. Over in the tire building room is another overhead conveyer with the same L shaped hooks. As soon as a tire is built, it is placed on one of the hooks and carried to the curing room. There it is inspected and stored on the new racks until ready for curing.

There have also been some changes in the industrial products division. One of the most interesting is a new machine for branding fan belts. The belt is inserted in the machine which stamps the name and size on it much more clearly than was possible by hand. A new clicker machine to cut patches has also been added, in addition to new presses for patches, another building lathe for fan belts, molds for new sizes of fan belts, and new mandrels to be used in the manufacture of auto radiator hose.

Dunlop Tire & Rubber Goods Co., Toronto 8, Ont., through President and General Manager James I. Simpson has announced the following executive appointments. W. R. Walton, Jr., works manager, becomes assistant general manager; while his former post goes to Assistant Works Manager W. H. Bartlett. New assistant secretary-treasurer is G. F. Plummer, formerly accountant, and L. E. Levey has been advanced from sales manager tire division to general sales manager.

Gutta Percha, Ltd., Changes

Gutta Percha & Rubber, Ltd., West Lodge Ave., Toronto 3, Ont., has elected C. S. Band chairman of the board and J. Ross Belton president and general manager. F. A. Warren, who resigned as president, remains a director and treasurer of the company.

Mr. Band joined the company in 1927 as a director and was appointed vice president in 1929. A native of Thorold, Ont., he was educated in Model School, Jarvis College, Toronto, and Upper Canada College. Mr. Band is also chairman of the board of Canadian Surety Co.; vice president of Goderich Elevator & Transit Co., and a director of Manufactures Life Insurance Co. and of Toronto General Trust Corp. Besides he is president of the Art Gallery of Toronto; a governor of Havergal College; a past president of the Federation for Community Service; a past vice president of the Canadian Chamber of Commerce; and a member of the National Council of Education, Toronto Board of Trade, Management Committee Navy League of Canada, of the executive board of the Ontario Safety League, and of the Toronto Golf, Arts & Letters, Empire, and Canadian clubs.

Mr. Belton, who was born in London, Ont., attended London College Institute, University of Toronto, and Queens University (Engineering), graduating in 1920 with a B.Sc., after being in the Armed Services from 1915-1919. Shortly after graduation Mr. Belton came to the Gutta Percha company, and promotions followed: assistant supervisor, planning department, 1921; supervisor of the department, 1922; assistant general manager, 1936; general manager, 1943; vice president, general manager, and a director, 1946; president, general manager, and a director, 1947.

Goodyear Tire & Rubber Co. of Canada, Ltd., New Toronto, Ont., has appointed J. G. Williams comptroller and assistant secretary, and P. B. Stevenson and C. W. J. Evans, assistant comptrollers.

The company later, through General Sales Manager Carl B. Cooper, reported the appointment of Fred. G. Willmot as manager of tire sales and Jack M. Templeton as manager of the service department. Mr. Willmot, with Goodyear Canada more than 20 years, has served as manager of the service department, the automobile tire department, and the dealer development department; while Mr. Templeton, also a veteran Goodyear employe, has had considerable experience in the field and at headquarters in sales and service work.

Canadian Oil Cos. has purchased the Goodyear building on Richmond St., Toronto, and will occupy half the premises as soon as necessary arrangements can be made.

The rubber company last fall purchased a building on Fleet St., Toronto, which, upon completion of the refurnishing and redecorating, Goodyear will use as head office for its Toronto branch, for certain executive offices, and in part for local warehouse space.

Stokes Expansion Held Up

Lloyd R. Leaver, vice president and managing director of Joseph Stokes Rubber Co. Ltd., Welland, Ont., late last month announced that it had been decided to postpone the construction of the large addition to the Stokes plant, for which a contract was being negotiated, and plans for which had been previously widely reported.

"The major part of this addition was to have been used," Mr. Leaver stated, "for the manufacture of Thermoid automotive products primarily for export markets. The news eminating recently from London and the opening of the Geneva Tariff Conference indicating the possibility of the discontinuance of certain international tariff preferences as well as the possibility of the elimination of the British Preferential Tariff and the fact that all of Stokes milling capacity is now taken up in aiding other rubber companies influenced directors in this decision.

"Further addition to the Stokes plant will be undertaken later in the year, however," Mr. Leaver stated, "to provide additional raw material storage space and manufacturing space for the present Stokes lines as well as more modern washrooms and rest rooms for the employes to improve working conditions. A larger research laboratory also will be erected entailing additions to the present plant of approximately 24,000 square feet."

OBITUARY

Aaron G. Ladrach

AARON GEORGE LADRACH, president of the Magnetic Gauge Co., Akron, O., died on April 8 at Akron. The cause of his death was coronary embolism.

Mr. Ladrach, who was also the owner of the A. G. Ladrach Co., was born in Ragersville, O., on December 1, 1885. He attended Ragersville schools and later Bliss Electrical College in Washington, D. C. He held several patents covering industrial gages for measuring thicknesses of sheeted materials.

Mr. Ladrach was a member of the Ohio Society of New York, the National Association of Manufacturers, the National Small Business Men's Association, and the Ohio Chamber of Commerce.

Funeral services and burial were held on April 11 at Ragersville.

He is survived by his wife.

Edgar H. Gorsuch

EDGAR H. GORSUCH, factory manager of the Corduroy Rubber Co., Grand Rapids, Mich., died on April 14. He succumbed to a heart attack at his home in Grand Rapids at the age of 56.

Born in Barberton, O., Mr. Gorsuch was associated with two tire manufacturing firms in Akron before coming to the Corduroy plant in 1925 as chief chemist and assistant factory manager. In 1929 he became factory manager.

Mr. Gorsuch, a past president of the Greater Grand Rapids Safety Council, was also a member of the board of deacons of East Congregational Church, the Masonic order, the Industrial Executives Club, and the Cascade Country Club. He was also active in civic affairs.

Surviving are his wife, a daughter, a son, a brother, and a sister.

George A. Hull

GEORGE A. HULL, a vice president and a director of the Union Asbestos & Rubber Co., Chicago, Ill., with which he had been associated since 1923, died on April 5 at Vista, Calif.

Mr. Hull, known for his special work on refrigerator cars and other railroad equipment, was born on June 14, 1882. He was associated with the Great Northern Railroad for five years and then became assistant mechanical engineer on the Rock Island Railroad. Before coming to the Union Asbestos & Rubber Co. in the Los Angeles area in May, 1945, he was general manager of the equipment specialties division of the company.

Funeral services and burial were held on April 2 at Vista.

He is survived by his wife, three daughters, and a brother.

Henry Ford

HENRY FORD, founder of the great Ford industrial empire, is dead. The noted pioneer of the automotive industry was 83 when he passed away at his home in Dearborn, Mich., on April 7. He had retired for the second time, a little over a year and a half ago, turning the presidency of the Ford Motor Co. over to his grandson, Henry Ford, 2nd.

Henry Ford, the formulator of the modern American method of mass production and the conveyer-line system, was born on July 30, 1863, near Dearborn. When he ran away from home at the age of 16, a year after he had left school, it was to work as an apprentice in a machine shop in nearby Detroit. He spent his spare time reading about and experimenting with the gasoline engine. In 1892, while working as an engineer and machinist with the Detroit Edison Co., he completed his first "gasoline buggy." Soon afterward he persuaded a group of business men to organize the Detroit Automobile Co., which manufactured cars after his first model. But two years later Ford broke with them over a matter of policy. Then in 1903 he was able to organize the Ford Motor Co.

In 1938, Mr. Ford embodied the latest developments of the rubber industry with his successful production principles in his new mechanized tire factory at the Rouge Plant, Dearborn. He also purchased rubber plantations in Brazil, which supplied the rubber used at the tire plant. By owning collateral industries such as these Ford was able to save time, material, and men.

Ford, the last of the famous trio of Henry Firestone, Thomas A. Edison and himself, was involved from time to time in politics, publishing, and restoring historical property. He made headlines when he hired a ship to try to bring the boys back in the First World War, when he had trouble with the unions, and when he fought the New Deal.

Mr. Ford leaves a wife, three grandsons, and a granddaughter.

Funeral services were at St. Paul's Episcopal Cathedral in Detroit on April 10, and burial was at the Addison Ford Cemetery.

FINANCIAL

Anaconda Wire & Cable Co., New York, N. Y. For 1946: net income, $3,094,161, equal to $7.33 a share, against $646,324, or $1.53 a share, in 1945; federal income tax $2,250,000, against $1,350,000.

Flintkote Co., New York, N. Y., and subsidiaries. Twelve weeks to March 22: net income, $1,689,546, equal to $1.35 each on 1,183,921 common shares, contrasted with $541,084, or 46¢ each on 1,033,921 shares, in the 1946 period; net sales, $15,090,757 (a record), against $10,034,842; provision for taxes, $1,055,939, against $361,924.

Brunswick-Balke-Collender Co., Chicago, Ill. First quarter, 1947: net earnings, $260,485, against $36,636 in the corresponding period a year ago; sales, $6,086,637, against $3,562,938.

Crown Cork & Seal Co., Inc., Baltimore, Md., and wholly owned domestic subsidiaries. For 1946: net income $3,090,206, equal to $4.21 each on 603,895 common shares, against $2,355,073, or $3.02 a share, in 1945. March quarter, 1947: net income $1,103,853, equal to $1.60 a common share, against $449,522 or 52¢ a share, in the first quarter last year; net sales, $16,828,643 against $12,813,468.

Denman Tire & Rubber Co., Warren, O. For 1946: net income, $316,140, equal to $1.56 a common share, against $163,118, or 84¢ a share, in 1945; net sales, $4,267,188, against $3,105,611.

Detroit Gasket & Mfg. Co., Detroit, Mich. For 1946: net profit, $300,749, equal to $1.33 each on 214,250 shares, compared with $354,501, or $1.51 a common share, the year before.

DeVilbiss Co., Toledo, O., For 1946: net profit, $910,942, equal to $2.98 a share, contrasted with $507,948, or $1.58 a share, in the previous year.

Dow Chemical Co., Midland, Mich., and subsidiaries. Nine months to February 28, 1947: net profit, $8,989,577, equal to $6.46 a common share, contrasted with $5,425,507, or $3.61 a share, for the corresponding period a year earlier.

General Electric Co., Schenectady, N. Y. First three months, 1947: net profit, $16,763,650, equal to 58¢ a common share, contrasted with a net loss of $13,701,580 in the 1946 quarter, when the principal plants were closed for nine weeks because of a strike; net sales billed, $233,819,167, against $60,426,744.

Hercules Powder Co., Wilmington, Del. First three months, 1947: net earnings, $4,032,448, equal to $1.49 a common share, against $1,751,253, or 62¢ a share, in the 1946 quarter; net sales, $35,664,566, against $23,003,774.

Monsanto Chemical Co., St. Louis, Mo. First quarter, 1947: net income, after provision of $500,000 for relief of Texas City employes, $4,944,502, equal to $1.19 a common share; sales, $36,216,506, 47% above the 1946 figure.

Pharis Tire & Rubber Co., Newark, O. Year ended October 31, 1946: net profit, $1,562,714 (a record), equal to $3.68 each on 424,400 shares of outstanding stock, compared with $145,193, or 34¢ a share, in the preceding fiscal year; consolidated net sales, $19,914,495, a new high and 50% above the 1945 figure.

Scovill Mfg. Co., Inc., Bridgeport, Conn., and subsidiaries. For 1946: net income, $3,207,203, equal to $2.61 each on 1,196,386 common shares, compared with $2,475,971, or $3 each on 1,046,838 common shares, in the preceding 12 months; inventory reserve, $29,500, against $666,907.

Seiberling Rubber Co. of Canada, Ltd., Toronto, Ont., Canada. For 1946: net profit, $80,804, equal to $1.62 a share, against $41,183, or $1.31 a share, the year before; net working capital, $1,011,397, against $904,784.

Thermoid Co., Trenton, N. J., and subsidiaries. For 1946: net income, $853,197, equal to $1.19 a common share, against $475,194, or 63¢ a share, the year before.

Thiokol Corp., Trenton, N. Y. For 1946: net loss, $55,427, compared with net loss of $13,827 in 1945.

Union Carbide & Carbon Corp., New York, N. Y. First quarter, 1947, consolidated net income, $19,185,107, equal to $2.04 each on 9,366,488 capital shares outstanding, compared with $10,468,707, equal to $1.12 each on 9,277,788 shares outstanding, in the same period a year ago; gross sales, $126,388,346, against $88,987,667; reserve for taxes, $14,444,600, against $8,397,684.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Baldwin Rubber Co.	Com.	$0.17½	Apr. 25	Apr. 15
Crown Cork & Seal, Ltd.	Com.	0.50 q.	May 15	Apr. 23
Dayton Rubber Mfg. Co.	Com.	0.30	Apr. 25	Apr. 10
Dayton Rubber Mfg. Co.	Pfd. "A"	0.50 q.	Apr. 25	Apr. 10
Detroit Gasket & Mfg. Co.	Com.	0.12½	Apr. 27	Apr. 15
De Vilbiss Co.	Com.	0.25	Apr. 21	Apr. 10
Electric Hose & Rubber Co.	Com.	0.30 q. init.	May 21	May 14
Electric Hose & Rubber Co.	Com.	0.10 extra	May 21	May 14
Firestone Tire & Rubber Co.	Pfd.	1.12½ q.	June 1	May 15
Goodyear Tire & Rubber Co.	Com.	1.00 q.	June 16	May 15
Goodyear Tire & Rubber Co.	Pfd.	1.25 q	June 16	May 15
Goodyear Tire & Rubber Co. of Canada, Ltd.	Pfd.	0.50 q.	Apr. 30	Apr. 10
Gro-Cord Rubber Co.	Com.	0.10 q.	Mar. 31	Mar. 21
Lee Rubber & Tire Corp.	Com.	0.50 q.	May 1	Apr. 15
Midwest Rubber Reclaiming Co.	Com.	0.25 q.	May 1	Apr. 19
Parke, Davis & Co.	Com.	0.40	Apr. 30	Apr. 11
Thermoid Co.	Pfd.	0.62½ q.	May 1	Apr. 25
Union Asbestos & Rubber Co.	Com.	0.17½ q.	July 2	June 10
S. S. White Dental Mfg. Co.	Com.	0.37½	May 13	Apr. 28

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Patents and Trade Marks

APPLICATION

United States

2,416,357. **Friction Seal Coupling Including a Body Member, and a Connector with an Outer Shell and Resilient Lining.** F. E. Smith, United States Navy.

2,416,391. **Fluid Transfer Apparatus Including a Flexible Conduit.** C. R. Hixson, Phoenixville, assignor to Wyeth Inc., Philadelphia, both in Pa.

2,416,411. **Facepiece.** W. J. Sharbaugh, Wilkinsburg, and W. P. Yant, Murraysville, assignors to Mine Safety Appliances Co., Pittsburgh, all in Pa.

2,416,471. **Water Sport and Life-Saving Device Including in Combination a Pair of Inflatable Floats and Means Rigidly Connecting Them and Including a Crankshaft with a Pair of Handgrips Rotatably Mounted Thereon.** J. O. de Chappedelaine, Reading, Pa.

2,416,480. **Electrical Brush Including a Mixture of Electrically Conductive Material with a Binder of Thermosetting Melamine Resin.** A. C. Henry and J. L. Bitonte, assignors to Henrite Products Corp., all of Ironton, O.

2,416,510. **For Use in the Formation of Light-Polarizing Images, a Composite Plastic Sheet Including a Support of a Sheet of Cellulose Acetate, and at Least Two Flexible Layers of Polyvinyl Alcohol; the Outermost of These Layers Has Its Molecules Oriented in Parallelism.** F. J. Binda, assignor to Polaroid Corp., both of Cambridge, Mass.

2,416,521. **Reticulated Material Secured to the Surface of Fibrous Material by Decorative Hardened Self-Adherent and Upstanding Globules of Synthetic Resin.** H. Freiburg, assignor of one-half to S. Freiburg, both of London, England.

2,416,556. **Water-Repellent Sheath to Protect a Trouser Leg.** C. L. Weeks, Garyville, Ind.

2,416,561 **Flexible Electric Cable for Simultaneously Conducting High-Frequency Electric Currents and Compressed Air.** F. G. Albin, Los Angeles, Calif., assignor to Radio Corp. of America, a corporation of Del.

2,416,572. **Windshield Wiper and Defroster.** R. L. de Cordova, Tracy, Calif.

2,416,596. **Fountain Pen.** S. Rosenthal, Richmond Hill, N. Y.

2,416,618. **In a Pipe Joint Including Pipe Sections of Cementitious Material and Including an Interfitting Bell and Barrel, an Elastic Gasket Compressed in a Circum.erential Groove between Bell and Barrel.** J. Ferla, East Orange, assignor to U. S. Asbestos Cement Pipe Co., Camden, both in N. J.

2,416,623. **Cream Separator Having a Flat, Resilient Diaphragm.** W. F. Hampton, Hutchinson, Kans.

2,416,823. **To Relieve Pressure of a Corn or Callous on the Human Foot, a Device Including Two Pads Held in Position by Elastic Straps.** J. C. Day, Lexington, Ky.

2,416,839. **Necktie Lining Including a Member of Elastic Material Secured to One Face thereof.** F. P. Mulhauser, assignor, by mesne assignments to Superba Cravats, both of Rochester, N. Y.

2,416,844. **Transfer, Including a Backing Sheet Detachably Carrying a Design Consisting of a Thin Layer of Pure Uncured Rubber and Pigment, without Vulcanizing Agents or Accelerators, and a Thin Layer of Pure Rubber without Vulcanizing Agents or Accelerators Overlying the Design.** T. S. Reese, University Heights, assignor to Di-Noc Mfg. Co., Cleveland, both in O.

2,416,857. **Sleeping Garment Having a Body Portion with Sections Extending from Waist to Crotch, with at Least One Section of Elastically Extensible Material.** B. H. Trinkel, Providence, R. I.

2,416,877. **Balloon Grenade.** M. P. Laughlin, St. Petersburg, Fla.

2,416,900. **Rubber Valve for a Vacuum Seal for a Container.** G. L. Busby, Glendale, Calif.

2,416,955. **Heat-Resistant Electric Insulation Including Rubber and Halogenated Diphenyls.** S. J. Rosch, Yonkers, N. Y., assignor to Anaconda Wire & Cable Co., a corporation of Del.

2,416,979. **Electric Cable Having Low Capacity and Low Loss Angle, Consisting of a Wire Conductor, Surrounded by Tubular Braided Flexible Conductor, and Two Insulating Layers Surrounding the Wire Conductor, at Least the Outer Layer Constituting an Open Braided Sleeve of Vinyl Resin Plastic.** J. C. Burley, Milton, Mass.

2,417,065. **Thermoplastic Cement for Attaching Soles.** P. H. Dixon, Wenham, and J. R. Ioannilli, Boston, both in Mass., assignors to United Shoe Machinery Corp., Flemington, N. J.

2,417,096. **Fluid-Damped Mounting.** L. F. Thiry, Montclair, N. J., assignor to General Tire & Rubber Co., Akron, O.

2,417,107. **Oil Seal for a Shaft Opening in a Housing, Which Includes an Annulus of Oil-Resistant Material Molded on a Hollow Thin-Walled Metallic Core.** R. S. Gregoire, assignor of 20% to H. L. Cox, and 20% to J. J. Thornton, all of Detroit, Mich.

2,417,127. **Orthopedic Heel.** C. A. Roberts, San Antonio, Tex.

2,417,177. **High-Altitude Flying Suit Including an Airtight Garment, a Breast Plate Tightly Fixed thereto, and a Helmet That Can Be Fixed to the Breast Plate.** M. J. Richou, Paris, France; vested in the Attorney General of the United States.

2,417,202. **In a Machine for Shaping the End Portion of a Tube and Including a Die Member Having a Recess for Receiving the End of the Tube to Be Shaped, a Ring of Elastic Deformable Material between Pressure Head and Inner Wall of the Recess.** H. E. Hull and E. C. Hartley, assignors to Parker Appliance Co., all of Cleveland, O.

2,417,226. **In a Veneer Press, Extensible, Fluid-Tight, Flexible Pressure Exerting Members.** R. G. Weyant, Elkhart, assignor to Superior Industries, Inc., Goshen, both in Ind.

2,417,256. **In a Temperature Change Compensator-Accumulator Unit for Hydraulic Systems, Including a Cylindrical Housing, a Flexible Elastic Diaphragm Mounted as a Partition in the Housing.** A. E. Kremiller, Glendale, Calif., assignor to Adel Precision Products Corp., a corporation of Calif.

2,417,262. **In a Sealing Nut, a Button-Like Member of Rubber or the Like.** E. M. Morehouse, Tujunga, Calif., assignor to Adel Precision Products Corp., a corporation of Calif.

2,417,263. **In a Cushioned Nut Unit, a Pad of Elastic Cushioning Material Having a Screw-Receiving Opening therein.** E. M. Morehouse, Tujunga, Calif., Calif., assignor to Adel Precision Products Corp., a corporation of Calif.

2,417,323. **Swimming Cap.** H. B. Richards and M. T. Crawford, assignors to Richards, Boggs & King, Inc., all of Chicago, Ill.

2,417,349. **Pump Seal Assembly Including a Sealing Cylinder of Resilient Material Having a Reinforcing Sleeve Embedded therein.** S. G. Colbaugh, Kilgore, Tex.

2,417,383. **In a Signal and Display Panel Including a Daylight Fluorescent Web of Cellulose Acetate Fabric, Anchor Coats of Vinyl Resin.** J. L. Switzer, Cleveland Heights, O.

2,417,390. **Sealing Ring for Insertion between Concentric Cylindrical Surfaces.** T. H. Winkeljohn, Wabash, Ind., assignor to General Tire & Rubber Co., Akron, O.

2,417,400. **In a Seal Assembly Including a Valve Body with a Flat Face and a Port, a Rubber Member Having Tubular Portion Snugly Seated in the Port.** J. R. Snyder, Cleveland, and J. Frederick Norton, Cleveland Heights, assignor to Thompson Products, Inc., Cleveland, both in O.

2,417,510. **Hollow Article Molded from a Resinous Compound and Lined with a Resin Impregnated Reinforcing Fabric Sheet.** A. B. McGinnis, assignor to Wheeling Stamping Co., both of Wheeling, W. Va.

2,417,512. **Belt of the Edge Driving V-Type Having a Layer of Cords between an Outer Layer of Rubber-Like Composition and an Inner Body of Rubber-Like Material Formed from Layers of Decreasing Hardness.** E. Nassimbene, assignor to Gates Rubber Co., both of Denver, Colo.

2,417,530. **In an Electrical Hair Removing Instrument Including a Casing, a Soft Rubber Tube in the Casing and Extending from It.** T. Weiser, New York, N. Y.

2,417,539. **Flexible Drill Jig Including a Flexible Sheet of Super-Imposed Layers of Rubber.** T. F. Aronson, New York, N. Y.

2,417,575. **Windshield Cleaner.** M. Thomson, Williamsville, assignor to Trico Products Corp., Buffalo, both in N. Y.

2,417,680. **Resilient Sanding Pad.** A. G. Decker, Baltimore Co., Md., assignor to Black & Decker Mfg. Co., a corporation of Md.

2,417,741. **Split Packing Ring Coupling Including a Transversely Split Ring-Shaped One-Piece Elastic Gasket Designed to Embrace Piping.** S. V. Dillon, Tulsa, Okla., assignor to Hanlon-Waters, division of General Finance Corp., a corporation of Mich.

2,417,750. **In a Brush, a Holder Including a Handle and a Head of Molded, Adhesive Plastic in Which the Bristles Are Set.** E. W. Hall, Scituate, Mass.

2,417,794. **For a Punch Press, a Die Cushion Having a Variable Volume Fluid Chamber.** H. B. Werner, assignor to Verson Allsteel Press Co., both of Chicago, Ill.

2,417,828. **Resilient Sealing Means in a Fluid Seal.** J. F. Joy, Washington, D. C.

2,417,838. **In a Garment Finishing Apparatus, an Air Receiving and Discharging Casing, an Upright Support, and an Inflatable Garment Form Suspended therefrom.** A. F. Paris, Brockway, Pa.

2,417,840. **As a Seal about a Moving Part, against a Fluid Medium, a Packing Ring Including a Member Formed of Plastic or Rubber-Like Material so as to Have a V-Shaped Cross-Section.** L. W. Rodgers and S. H. Simpson, both of Evanston, Ill.

2,417,849. **Buffer System for a Pontoon Having an Overhang Deck Portion, Including a Torque Arm, a Support on the Free End of the Torque Arm, and a Pneumatic Tire Mounted on the Support.** F. J. Walters and H. B. Nelson, both of the United States Navy.

2,417,925. **Adjustable Eraser.** J. Gerster-Seiler, Jegenstorf, Bern, Switzerland.

2,417,930. **Means for Preventing the Accumulation of Ice on an Airplane and Permanently Modifying the Contour of the Frontal Area of the Plane.** T. C. Harper, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,417,968. **In a Check Valve, a Molded Rubber Body Having Steps in an Interior Bore and Adapted to Receive a Correspondingly Stepped Fitting at One End.** L. H. Brown, Westport, Conn., assignor to American Brake Shoe Co., a corporation of Del.

2,418,002. **In a Resilient Rail Wheel Including Radial Hub Plates and an Annular Flanged Tread Member, Annular Radial Rubber Disks between Each of the Plates and the Flange.** A. O. Williams, Battle Creek, assignor to Clark Equipment Co., Buchanan, both in Mich.

2,418,034. **Respiration Apparatus.** A. J. Kizaur, Cicero, assignor to General Electrical X-Ray Corp., Chicago, both in Ill.

2,418,050. **Child's Diaper Support Featuring a Pair of Elastic Shoulder Straps.** B. M. Shank, Minneapolis, Minn.

2,418,064. **Airplane Tire.** H. T. Austin, Seattle, Wash.

2,418,069. **Hat Having Crown and Brim Portions Formed of Two Flexible Films of Gasproof Organic Plastic Material Sealed together so as to Divide the Interior into a Multiplicity of Gas Cells, and Means to Inflate These Cells.** W. R. P. Delano, Syosset, assignor to Richard Delano, Inc., Setauket, both in N. Y.

2,418,099. **Facing for a Clutch Energized by an Inflatable Gland.** W. P. Schmitter and E. J. Wellauer, both of Wauwatosa, assignors to Falk Corp., Milwaukee, both in Wis.

Dominion of Canada

439,734. **Rubber Insulated Cable Having a Protective Layer of a Vulcanized Compound of a Mixture of Neoprene or Perbunan, and Polyisobutylene.** British Insulated Cables, Ltd., Prescot, Lancashire, assignee of H. B. Chapman, Helsby, Cheshire, both in England.

439,769. **Vehicle Suspension.** Firestone Tire & Rubber Co., assignee of R. W. Brown, both of Akron, O., U.S.A.

439,770. **For an Internal Combustion Engine, an Ignition Device Formed of a Molded Plastic Material Composed Substantially of Melamine Resins.** Ford Motor Co. of Canada, Ltd., Windsor, Ont., assignee of E. Zoerlein, J. L. McCloud, and J. A. Mickey, all of Dearborn, Mich., U.S.A.

439,808. **For Adhering a Photosensitive Surface to a Metal Backing, a Waterproof Heat-Set and Heat-Resistant Adhesive.** R. G. Luff, Philadelphia, Pa., assignee of Mock-Up, Inc., New York, assignee of M. R. Hutchinson, Jr., Rochester, administrator of the estate of M. R. Hutchinson, deceased, in his lifetime of New York, both of N. Y., both in the U.S.A.

439,811. **In the Production of Sheets from an Acetone Solution of a Film-Forming Polymer, the Use of a Casting Surface Formed by a Non-Elastic Rubber Hydrochloride.** C. G. Benard, administrator of the estate of H. Dreyfus, deceased, assignee of W. H. Moss, all of London, England.

439,834. **In a Cassette for X-ray Radiography Including a Windowed Casing and Means Having a Rigid Backing for Clamping a Length of Sensitized Material to the Window, a Mat of Sponge Rubber Carried by the Backing.** F. T. Powers, Glen Cove, N. Y., U.S.A.

439,869. **Inflatable Boat.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of United States Rubber Co., New York, N. Y., assignee of F. F. Patten, Woonsocket, R. I., both in the U.S.A.

439,887. **In a Joint with Concentric Inner and Outer Metallic Elements, an Intervening Annulus of a Cured Rubber Compound.** General Tire & Rubber Co., assignee of G. H. Swart, both of Akron, O., U.S.A.

Coaxial cable furnished by Federal Telephone and Radio Corporation

–plasticize your vinyl compounds with Paraplex G-25

When unvarying quality and permanence are essential in your vinyl compounds, count on PARAPLEX G-25!

A typical instance: in coaxial cable produced by Federal Telephone and Radio Corporation, PARAPLEX G-25 is used because this resinous plasticizer is non-migrating. This property prevents contamination of the insulation, which would affect the properties of these highly specialized cables.

Other advantages of PARAPLEX G-25 are excellent ultra-violet resistance, high-temperature stability, low flammability and ease of processing, particularly on stocks, both extruded and calendered, where a high finish is desired.

If you are working with vinyl compounds, you'll want to know more about PARAPLEX G-25 . . . and about the MONOPLEX group of ester plasticizers.

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THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

439,904. **Laminated Body of Great Strength, Including Layers of Fabric Containing Glass Fiber Impregnated with a Hardened Thermosetting Aldehyde Reaction Product.** Libbey-Owens-Ford Glass Co., assignee of L. S. Meyer, both of Toledo, O., U.S.A.

439,911. **Abrasive Article in Which the Bonding Agent Is the Heat-Hardened Reaction Product of a Mixture of a Resorcin-Aldehyde Resin and a Methylene-Containing Setting and Hardening Agent.** Pennsylvania Coal Products Co., Petrolia, assignee of P. H. Rhodes, Butler, both in Pa., U.S.A.

439,995. **Acceleration Belt and Stockings for Aviators Including Inflatable Means for Applying Pressure.** Berger Bros. Co., assignee of I. R. Versoy, both of New Haven, and L. H. Loeffel, West Haven, both in Conn., U.S.A.

440,041. **Submarine Signalling System Including a Flexible, Inflatable Skin Attached at the Edges to the Surface of a Vessel to Form an Elongated Oval Body.** Submarine Signal Co., Boston, assignee of Raytheon Mfg. Co., Newton, a merger of Submarine Signal Co., assignee of E. E. Turner, Jr., West Roxbury, all in Mass., U.S.A.

440,059. **Article Suitable for Use as the Cloth-Engaging Part of a Loom Temple Roller and Formed of Fibers Partially Impregnated with a Flexible Film-Forming Material so as to Have the Consistency of Soft Vulcanized Rubber.** C. G. Bonard, administrator of the estate of H. Dreyfus, deceased, assignee of T. C. Woodman, all of London, England.

440,083. **Automobile Fender, Formed of Synthetic, Resiliently Flexible Plastic Material.** G. A. Lyon, Allenhurst, N. J., U.S.A.

440,104. **In Means for Preventing Accumulation of Ice on an Aircraft Propeller, a Resilient Bladder for Carrying a Supply of Anti-Freeze Fluid.** Bendix Aviation Corp., South Bend, Ind., assignee of M. L. Taylor, Hudson, O., both in the U.S.A.

440,215. **Adjustable Dress Form Including an Outer Network Consisting of Flexible Non-Resilient, Relatively Soft and Deformable Plastic Material.** F. S. Sander, New York, N. Y., U.S.A.

440,242. **Laminated Armor Plate Structure Including Oriented Laminae Composed of a Synthetic Linear Superpolymer with, as Bonding Agent, Diphenylol Propane-Formaldehyde Resin.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. W. Heckert, Wilmington, Del., U.S.A.

440,271. **Protective Covering for Preventing Accumulation of Ice on Aircraft.** B. F. Goodrich Co., New York, N. Y., assignee of W. H. Hunter, Cleveland, and W. C. Green, Akron, both in O., both in the U.S.A.

440,272. **Device to Prevent Accumulation of Ice on the Leading Edge of an Airfoil.** B. F. Goodrich Co., New York, N. Y., assignee of J. O. Antonson, Akron, O., both in the U.S.A.

440,283. **Rubber Elements in an Aircraft Engine Mounting.** Lord Mfg. Co., assignee of B. W. Campbell, both of Erie, Pa., U.S.A.

United Kingdom

584,983. **Wringers.** P. W. Lockwood.

584,991. **Anti-Vibration Mountings.** H. Clayton-Wright.

585,074. **Prevention of Ice Formation on Airplane Propellers.** British Thomson-Houston Co., Ltd., and L. J. Clark.

585,122. **Shock Absorbing Means for Cycle Wheels.** S. W. Hardy.

585,134. **Windshield Wipers.** J. Lucas, Ltd., and O. N. Lawrence.

585,221. **Resilient Bushes or Bearings.** Metalastik, Ltd., and M. Goldschmidt.

585,226-227. **Shock Absorbing Bearing.** E. Morf.

585,231. **Shock Absorber.** N. S. Focht.

585,251. **Endless Track for Tracklaying Vehicles.** Roadless Traction, Ltd., P. H. Johnson, and L. W. Tripp.

PROCESS

United States

2,416,888. **Substitute Leather Soles.** P. J. Wentworth, Fort Thomas, Ky.

2,416,962. **Plastic, Collapsible Tube.** E. Stather-Dunn and F. M. Menheneott, assignors to Betts & Co., Ltd., all of London, England.

2,417,009. **Coating Sheet Material with High Melting Thermoplastic Material.** B. C. Miller, Montclair, assignor to B. C. Miller, Inc., East Orange, both in N. J.

2,417,453. **Textile Product from Composite, Potentially Adhesive Filaments.** W. Wade, New York, N. Y., assignor to American Viscose Corp., Wilmington, Del.

2,417,466. **Pneumatic Tires for Airplanes, Etc.** N. H. Brewer, Rockville, Md.

2,417,586. **Resin-Bonded Laminated Structures.** P. Crosley, III, Coral Gables, Fla.

2,417,837. **Laminating a Sheet of Plastic from the Group of Polymers of Acrylic and Methacrylic Acids, Their Esters and Anhydrides, and a Second Sheet Consisting of a Plasticized Polyvinyl Acetal Resin Acetalized with an Aliphatic Aldehyde.** L. Paggi, Belleville, N. J., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,417,851. **Selective Impregnation of Accreted Fibrous Plastic Articles.** S. H. A. Young, Geneva, Ill., assignor, by mesne assignments, to Hawley Products Co., a corporation of Del.

2,417,881. **Composite Thermoplastic Resin-Metal Pipe Unit.** C. G. Munger, San Gabriel, Calif., assignor to American Pipe & Construction Co., a corporation of Del.

Dominion of Canada

439,811. **Sheets at Least 0.01-Inch Thick from an Acetone Solution of a Film Forming Polymer.** C. G. Bonard, administrator of the estate of H. Dreyfus, deceased, assignee of W. H. Moss, all of London, England.

439,899. **Elastic Designed Textile Fabric.** International Latex Processes, Ltd., London, England, assignee of T. G. Hawley, Jr., St. Paul, Minn., U.S.A.

439,903. **Bodies of Great Strength from Thermosetting Plastics Reinforced with Glass Fibers.** Libbey-Owens-Ford Co., assignee of A. M. Howald, both of Toledo, O., U.S.A.

439,936. **Rubber Gel Stripping Method.** United States Rubber Co., New York, N. Y., assignee of E. S. Ebers, Nutley, N. J., both in the U.S.A.

United Kingdom

584,990. **Shaping Rubber Articles.** United States Rubber Co.

585,088. **Packaging Material from Rubber Hydrochloride.** Wingfoot Corp.

CHEMICAL

United States

2,416,282. **Stabilizing an Elastomer, Produced by Curing with Benzoyl Peroxide, a Glycol-Dicarboxylic Acid Polyester, by Heating the Cured Polymer under a High Vacuum at above 125° C. Long Enough to Improve the Resistance to Hydrolysis.** B. S. Briggs, Summit, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,416,434. **Polymer of the Formula $RSCH_2X$, Where R Is the Residue of a Rubber-Like Polymer of a Diolefin, and X Is a Monovalent Organic Radical of the Group of Radicals Having the Formulae —OR′, —SR′, and**

$$\begin{array}{c} R' \\ | \\ -N-COR'' \end{array}$$

Where R′ Is a Lower Alkyl Group, and R″ Is of the Group of Hydrogen Atoms and Monovalent Lower Alkyl Groups. W. J. Burke, Marshallton, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,416,433. **Resinous Heat Reaction Product of a Mix Containing Rosin, Triethanolamine, Ethylene Glycol, a Dimerized Soybean Oil Fatty Acid, and a Polyvinyl Acetal Resin.** C. F. Brown, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,416,440. **Polymerizing in Aqueous Emulsion a Mixture of Butadiene-1,3 and an Unsaturated Compound, in the Presence of Bis (Isopropyl Xanthogen), and also in the Presence of Cetyl Mercaptan.** C. F. Fryling, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,416,456. **Synthetic Rubber-Like Material, the Copolymer of a Fluoro-1,3-Butadiene and Styrene.** L. F. Salisbury, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,416,461. **Polymerization of a Butadiene-1,3 Hydrocarbon in Aqueous Emulsion in the Presence of a Simple Ionizable Salt of a Metal Occurring in Group II-B of the Periodic Table, Whereby the Rate of Polymerization Is Substantially Increased.** W. D. Stewart, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,416,485. **Resin Consisting of an Acid Inter-Esterification Product of an Hydrolated Oil, a Hydroxy Polybasic Aliphatic Acid, and a Hydroxy Monobasic Aliphatic Acid; the Acid Number of the Resin Is of the Order of 200.** E. A. Lasher, assignor to California Flaxseed Products Co., both of Los Angeles, Calif.

2,416,500. **Purifying Furfural by Redistillation Subsequent to the Use of the Furfural in an Extractive Distillation Process for the Separation of Unsaturated Aliphatic Hydrocarbons from a Mixed Hydrocarbon Stream.** V. Searth, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,416,531. **Phenol Esters of Silicon Oxychlorides.** V. Morrill, Jr., assignor to American Stove Co., both of St. Louis, Mo.

2,416,536. **Copolymer Consisting of 50 to 90% of a Member of the Group of Acrylic Acid, Its Esters, Amides, and Nitrile, and from 5% to 50% of Acrolein.** H. T. Neher, Bristol, and C. F. Woodward, Abington, assignors to Rohm & Haas Co., Philadelphia, all in Pa.

2,416,607. **Fluoroacetamide.** J. C. Bacon, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,416,620. **For Decorating Textiles, a Composition Including a Pigment and, as a Vehicle therefor, a Heat-Convertible Synthetic Resin in a Solvent, the Resin is Catalytically and Non-Uniformly Advanced so that a Part of It Is Gelled while Part Remains Ungelled.** D. M. Gans, New York, N. Y., and J. R. Abrams, Jersey City, N. J., assignors to International Corp., New York, N. Y.

2,416,630. **Beta-Aminopropionic Acid.** P. M. Kirk, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,416,647. **Separation of a Butadiene-Isobutene Concentrate from a C_4 Hydrocarbon Mixture Including n-Butane, Butadiene, Isobutane, Butene-1, and Isobutene.** W. A. Schulze and J. C. Hillyer, both of Bartlesville, Okla., assignors to Phillips Petroltum Co., a corporation of Del.

2,416,667-668. **Improving the Compounding Characteristics of Rubbery Diene Polymers by the Incorporation of N-Halogen Amides.** H. E. Schroeder, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,416,756. **Continuous Preparation of an Ester of Alpha Methacrylic Acid.** L. T. Jilk, Charleston, W. Va., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,416,874. **Vulcanized Insoluble Interpolymer of 95% Vinyl Chloride and 5% Diethyl Fumarate Prepared by Heating for 50 to 60 Minutes at 130 to 150° C with 0.25 to 10% Sulfur, 3% 5% Zinc Oxide, and 0.25 to 5% Mercaptobenzothiazole, All Based on the weight of the Interpolymer.** B. W. Howk and H. J. Ritcher, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,416,878. **Curing an Essentially Saturated Interpolymer of Vinyl Chloride and Ethylene by Milling with a Metal Oxide of Group II, and a Thiuram Tetrasulfide, and Then Heating for at least 15 Minutes at 100 to 150° C.** R. V. Lindsey, Jr., and S. Le R. Scott, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,416,880. **Reaction Product of Polyvinyl Alcohol Containing at Least 3 Hydroxyl Groups per Mol and an Alpha-Polychlorinated Macromolecular Linear Polymeric Ether Containing at least 1% Chlorine and at least 3 Chlorine Atoms per Mol on Alpha Carbon.** C. W. Mortenson, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,416,890. **Manufacture of Fibers and Foils from a Mixture of an Alkali-Soluble Linear Superpolyamide Containing Sulfamide Groups and a Cellulosic Solution.** J. Amende and W. Ender, both of Ludwigshafen-on-the-Rhine, Germany; vested in the Attorney General of the United States.

2,416,901-902. **Hydrogenation of Pinene Resin.** W. H. Carmody, deceased, by M. O. Carmody, administratrix, assignor to Carmody Research Laboratories, Inc., all of Springfield, O.

2,416,903-905. **Hydrogenation of Coumarone-Indene Resin.** W. H. Carmody, deceased, by M. O. Carmody, administratrix, assignor to Carmody Research Laboratories, Inc., all of Springfield, O.

2,416,925-926. **For a Surgical Adhesive Tape, Adhesive Composition Including Crude Rubber and a Resin.** M. H. Kemp, Oak Park, Ill., assignor to Kendall Co., Boston, Mass.

2,416,965. **Methylindane.** G. L. Thomas and H. S. Bloch, both of Riverside, assignors to Universal Oil Products Co., Chicago, both in Ill.

2,416,990. **Production of Styrene from a Mixture of Benzene and Propylene.** M. H. Gorin and E. Gorin, both of Dallas, Tex., assignors, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y.

2,417,014. **Acidic Solution of a Partially Polymerized Melamine-Formaldehyde Condensation Product in a Solvent Including an Aqueous Aliphatic Polyhydric Alcohol Solution.** J. D. Pollard, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,417,024. **Acrolein Oxime and Acrylonitrile.** K. H. W. Tuerck, Banstead, and H. J. Lichtenstein, London, both in England, assignors to Distillers Co., Ltd., Edinburgh, Scotland.

2,417,027. **Chloroanthraquinone Compounds.** V. Weinmayr, Pitman, N. J., assignor to E. I. du Pont De Nemours & Co., Inc., Wilmington, Del.

2,417,034. **Emulsion Polymerization of Butadiene in the Presence of a Water-Soluble Complex Metal Cyanide, in an Inert Atmosphere.** M. A. Youker, Cragmere, Del., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,417,048. **Separation and Segregation of a Diolefin from a Hydrocarbon Mixture Containing a Diolefin and a Monoolefin with the Aid of a Cuprous Salt Solution.** A. L. Antonio, Baton Rouge, La., assignor by mesne assignments to Jasco, Inc., a corporation of La.

2,417,068. **Preparing Vinyl Cyanide from a Mixture of Acetylene and Hydrogen Cyanide Contacted with a Cuprous Chloride/Ammonium Chloride Complex.** M. W. Farlow and W. A. Lazier, assignor to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,417,093. **In Processing a Solid Interpolymer of a Major Proportion of an Isoolefin Having not More Than 7 Carbon Atoms per Molecule with a Minor Proportion of a Conjugated Diolefin having 4 to 6 Carbon Atoms per Molecule, the Step of Heating a Solution of the Interpolymer with a Sulfur Chloride to Produce a Partly Sulfurized Polymer Millable to Plasticity and Reactive with Elemental Sulfur to Yield an Elastic Product.** W. J. Sparks, Elizabeth, and H. B. Kellog, Union City, both in N. J., assignors, by mesne assignments, to Jasco, Inc., a corporation of La.

2,417,100. **Unsaturated Bicyclic Glycols.** H. A. Bruson, Rydal, and W. D. Niederhauser and H. Iserson, assignors to Resinous Products & Chemical Co., all of Philadelphia, both in Pa.

2,417,238. **Casting Polymerizable Compounds to Form Shaped Articles, by Polymerizing a Compound from the Group of the Esters of Acrylic, Alpha-Chloroacrylic, and Methacrylic Acids, in Bulk, in the Presence of a Catalyst Mixture of an Organic-Peroxy Compound, Sulfur Dioxide, and a Liquid 1,3-Dioxolane.** R. E. Christ, Elizabeth, and B. M. Marks, Newark, both in N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,417,280. **Producing Butadiene from a Peroxide-Containing Feed Stock Formed from a Petroleum Distillate Fraction, Reacting with Lead Mercaptide, Redistilling, and Heating the Distillate Fraction to a Cracking Temperature.** P. S. Viles, Goose Creek, Tex., assignor to Standard Oil Development Co., a corporation of Del.

2,417,293. **Molecularly Oriented Copolymers of Acrylonitrile, a Vinyl Aryl Compound, and Acrylic Esters or Vinyl Ethers.** G. F. D'Alelio, Northampton, Mass., assignor to Pro-phy-lac-tic Brush Co., Northampton, Mass.

2,417,294. **Molecularly Oriented Copolymerizates of Acrylonitrile and Another Polymerizable Monomer Containing a Single Olefinic Double Bond.** G. F. D'Alelio, assignor to Pro-phy-lac-tic Brush Co., both of Northampton, Conn.

2,417,380. **Alpha-Nitro-Isobutene.** A. E. W. Smith and C. W. Scaife, Norton-on-Tees, England, assignors to Imperial Chemical Industries Ltd., a corporation of Great Britain.

2,417,404. **Resinous Copolymer Prepared from a Mixture of a Compound from the Group of Vinyl Acetate, Methyl Acrylate, Methyl Alpha-Methacrylate and Styrene, and a Diacylate of a Mono-Carboxylic Acid.** L. W. Minsk and C. C. Unruh, assignors to Eastman Kodak Co., all of Rochester, N. Y.

2,417,405. **Artificial Leather Consisting of a Rubberized Fabric Base Having an Intermediate Coating Containing Cellulose Nitrate, Solvent, Dibutylphthalate, Alkyd Resins, Butylstearate, Diluents, and Dioctyl Sodium Sulfosuccinate, and a Final Nitrocellulose Coating.** F. J. Bellac, New York, N. Y.

2,417,424. **Treating an Aldehyde-Modified Rubber from the Group of Natural Rubber and Neoprene with an Organic Compound Having 2 to 3 —N=C=X Groups, Where X Is a Chalcogen of Atomic Weight below 33.** G. H. Latham, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,417,455. **An Ether of a Terpene and a Nitro-Substituted Monohydric Alcohol from the Group of Nitroethanol, 2-Methyl-2-Nitro-Propyl Alcohol, and Nitroisoamyl Alcohol.** R. F. B. Cox, assignor to Hercules Powder Co., both of Wilmington, Del.

2,417,548. **Preparation of Dioxanes by Reacting a Hydrocarbon Oil Containing a Substance from the Group of Indene, Styrene, Coumarone and their Homologs with an Aqueous Formaldehyde Solution in the Presence of Mineral Acids.** K. H. Engel, Teaneck, N. J., assignor to Allied Chemical & Dye Corp., New York, N. Y.

2,417,607. **Heating a Mixture of a Vinyl Aromatic Hydrocarbon Having a Single Vinyl Group Attached to the Aromatic Nucleus and Fumarodinitrils to Form an Interpolymer.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,417,608. **As Insulation for an Electrical Conductor, an Interpolymer Consisting of 0.5 to 30% of Copolymerized Fumarodinitrile; the Balance of the Interpolymer Is Copolymerized Styrene.** D. T. Mowry, Dayton, O., assignor to Monsanto Chemical Co., St. Louis, Mo.

2,417,635. **Removing Acetylene Polymer Impurities from a Crude Acrylonitrile Containing an Acetylene Polymer, and Impurities Tending to Promote Water Solubility of an Acetylene Polymer.** H. S. Davis, Greenwich, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,417,748. **Preparing Methyl Acrylate by Subjecting a Mixture of Ketene and Methyl Lactate to Pyrolysis at 400 to 600° C.** H. J. Hagenmeyer, Jr., Kingsport, Tenn., assignor Eastman Kodak Co., Rochester, N. Y.

2,417,792. **Adhesive Composition for Bonding Textile Reinforcing Structures to Elastomeric Stock, Which Is the Reaction Product of an Organic Diisocyanate and an Elastic Isoprene Polymer Dissolved in an Organic Solvent for the Reaction Product.** J. J. Verbanc, Tuxedo Park, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,417,862. **Recovering Anhydrous Acetonitrile from Aqueous Solutions thereof by Decantation and Distillation.** C. H. Dale, Lewiston, N. Y., assignor, by mesne assignments, to United States Vanadium Corp., a corporation of Del.

2,417,872. **Dimethyl Butene from Propylene.** R. M. Hill and H. G. Codet, Mountainside, N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,417,885. **Forming an Adherent, Alcohol-Insoluble Vinyl Resin Film on a Copper Surface.** G. M. Powell, 3d., South Charleston, W. Va., and E. F. Carlston, Arlington, Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,417,892-893. **Producing Amines and Nitriles by the Reaction of Olefins with Ammonia at Elevated Temperatures and Elevated Pressure in the Presence of Reduced Cobalt Oxide as Catalyst.** J. W. Teter, Chicago, Ill., assignor to Sinclair Refining Co., New York, N. Y.

2,417,959. **Cast Phenol Formaldehyde Resin.** C. S. Webber, Loudenville, N. Y., and S. B. Luce and F. M. Murdock, both in Springfield, Mass., assignors to Monsanto Chemical Co., St. Louis, Mo.

2,417,975. **Reacting in Aqueous Medium Resorcinol, Formaldehyde and an Amine to Form an Alkaline Aqueous Solution of a Potentially Reactive Resin, and Mixing with Alkaline Latex.** E. S. Ebers, Nutley, N. J., assignor to United States Rubber Co., New York, N. Y.

2,417,989. **Producing an N-Substituted Aryl Thiazyl Sulfenamide by Oxidative Condensation between a Water-Soluble Mercaptide of a 2-Aryl Thiazole and an Amine Having at Least One Replaceable Hydrogen Atom.** R. G. D. Moore, Dedham, and J. K. Sanford, Wellesley, both in Mass., assignors to United State Rubber Co., New York, N. Y.

2,418,018. **Laminated Article Including a Sheet of Methyl Methacrylate Polymer and a Sheet of a Polyvinyl Butyral Resin; the Sheets Are Joined together by an Adhesive Including an Acid Polysilicic Acid Ester.** M. L. Ernsberger and P. S. Pinkley, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,418,025. **Adhering Rubber to a Steel Base Member by Halogenating a Surface of the Rubber and Arranging Intervening Bonding Layers Contiguous to the Halogenated Surface of the Rubber and to the Base Member; the Bonding Layers Include Two Layers of Chlorinated Rubber and there between a Layer of Unvulcanized Butadiene-Acrylonitrile Copolymer, and Completing Adhesion by Vulcanizing in the Absence of High Temperatures and Pressures.** B. S. Garvey, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,418,051. **Polycyclic Methylpolysiloxane.** D. W. Scott, Schenectady, N. Y., assignor to General Electric Co., a corporation of N. Y.

2,418,093. **Selectively Reacting Hydrogen Chloride with the Isobutylene in a Mixture of Isobutylene- and Butadiene-Containing Hydrocarbons of the C_4 Series by Treating the Mixture in the Liquid Phase with Anhydrous Hydrogen Chloride in the Presence of a Bleaching Clay and at 10 to 50° C.** R. P. Perkins and R. H. Rigternik, assignors to Dow Chemical Co., all of Midland, Mich.

Dominion of Canada

439,773. **Fused Lead Resinate of a Polymerized Rosin.** Hercules Powder Co., assignee of J. N. Borglin, both of Wilmington, Del., U.S.A.

439,774. **Lead Resinate of a Polymerized Rosin.** Hercules Powder Co., Wilmington, Del., assignee of F. H. Lane, Hillsdale, N. Y., both in the U.S.A.

439,775. **Lead Resinate of a Polymerized Rosin.** Hercules Powder Co., assignee of P. R. Mosher, both of Wilmington, Del., U.S.A.

439,776. **Homogeneous Fused Salt of a Natural Rosin and Manganese.** Hercules Powder Co., assignee of H. A. Elliott, both of Wilmington, Del., U.S.A.

439,858. **In Polyvinyl Chloride Chlorination, the Steps of Adding Water and Polyvinyl Chloride to an Organic Solvent to Form a Solution of Polyvinyl Chloride Containing at least 0.06% by Weight of Water, and Passing Chlorine into This Solution.** Canadian Industries Ltd., Montreal, P. Q., assignee of J. Chapman, Halewood, and J. W. C. Crawford, Frodsham, both in England.

439,898. **Method of Treating Fabrics Which Includes Direct Deposition of Rubber from an Aqueous Suspension of Rubber and Subsequent Rinsing in an Aqueous Bath Containing a Cation-Active Agent.** International Latex Processes, Ltd., London, England, assignee of H. A. Young, Westfield, N. J., U.S.A.

439,910. **Resin Having Uniform Properties, Prepared by Heating a Mixture of a Dihydroxy Benzene, a Non-Alkaline Catalyst, and a Liquid Diluting Medium, under Reflux Conditions, and Subsequently Adding an Aldehyde.** Pennsylvania Coal Products Co., Petrolia, Pa., assignee of A. J. Norton, Seattle, Wash., both in the U.S.A.

439,912. **Permanently Fusible Resin Containing as Its Essential Ingredient a Resorcin-Aldehyde Resin.** Pennsylvania Coal Products Co., Petrolia, assignee of P. H. Rhodes, Butler, both in Pa., U.S.A.

439,913. **Permanently Fusible Resinous Mass.** Pennsylvania Coal Products Co., Petrolia, assignee of P. H. Rhodes, Butler, both in Pa., U.S.A.

439,992. **Polymerization of Acrylonitrile in an Aqueous Solution of a Zinc Salt.** American Cyanamid Co., New York, N. Y., assignee of E. L. Kropa, Old Greenwich, Conn., both in the U.S.A.

440,098. **Reacting Phthalic Anhydride with Glycerine at Elevated Temperatures in the Presence of Melamine to Produce Phthalic Glyceride Resins of Low Acid Number.** American Cyanamid Co., New York, N. Y., assignee of H. J. West, Riverside, Conn., both in the U.S.A.

440,099. **Producing Unsaturated Derivatives of Substances from the Group of Alpha-Hydroxyisobutyric Acid Esters and Acetone Cyanhydrin by Pyrolyzing a Mixture of Acetic Anhdride with One of the above Substances in the Presence of a Catalyst.** American Cyanamid Co., New York, N. Y., assignee of P. M. Kirk, Stamford, and P. P. McClellan, Old Greenwich, both in Conn., both in the U.S.A.

440,223. **Preparing Melamine by Fusing a Mixture of Cyanamide or Dicyanamide and an Alkali Metal Salt of a Weak, Non-Oxidizing Acid.** American Cyanamid Co., New York, N. Y., assignee of D. W. Jayne, Jr., Old Greenwich, and H. M. Day, Cos Cob, both in Conn., both in the U.S.A.

440,224. **Polyhydric Alcohol Monoether of an Aliphatic Polycarboxylic Acid Ester.** American Cyanamid Co., New York, N. Y., assignee of E. R. Meincke, Stamford, Conn., both in the U.S.A.

440,226. **Resinous Composition Obtained by Polymerization of a Mixture Including an Unsaturated Alkyd Resin and a Polyester of a Saturated Polycarboxylic Acid and an Allyl Alcohol.** American Cyanamid Co., New York, N. Y., assignee of E. L. Kropa, Old Greenwich, Conn., both in the U.S.A.

440,237. **Chlorinated Polymer of Vinyl Chloride.** Canadian Industries, Ltd., Montreal, P. Q., assignee of R. G. R. Bacon and W. J. R. Evans, both of Blackley, Manchester, England.

440,238. **Cast Synthetic Resin Obtained from a Mixture of Solid Particles of a Polymerized Ethenoid Compound, and, as Solvent therefore, a Liquid Ethenoid Monomer.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. L. Macht and J. G. Stansbury, both of Arlington, N. J., U.S.A.

440,240. **Dental Material Including a Monomeric Compound from the Group of Acrylic and Methacrylic Acids and the Anhydrides and Esters of the Acids and Catalytic Amounts of an Organic Compound.** Canadian Industries, Ltd., Montreal, P. Q., assignee of F. C. Hahn, Key, Wilmington, Del., U.S.A.

440,241. **Preparation of 1,3-Dioxolane Polymer from Ethylene Oxide Reacted with an Aqueous Solution of Formaldehyde in the Presence of Sulfuric Acid as the Catalyst.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. F. Gresham, Wilmington, Del., U.S.A.

440,243. **Acetal of a Hydrolyzed Interpolymer of Ethylene with a Vinyl Ester of an Organic Carboxylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. H. Sharkey, Wilmington, Del., U.S.A.

440,245. **Trichloroacetonitrile and Its Polymers.** Canadian Industries, Ltd., Montreal, P. Q., assignee of R. T. Foster, Birkenhead, Cheshire, England.

440,299. **For Sheet Material, Moistureproof Top Coating Including a Copolymer of Vinyli-**


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QUALITY OF BASIC MATERIALS IN PROCESSING
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dene Chloride and Vinyl Chloride of High Viscosity, and an Intermediate Coating of Water-Resisting Film-Forming Material. Sylvania Industrial Corp., assignee of R. T. K. Cornwell, both of Fredericksburg, Va., U.S.A.

440,300. **Coating for a Textile Material, Including an Aqueous Alkaline Solution of a Hydrophilic Alkali-Soluble Cellulose Ether Insoluble in Water, and an Intermediate Anchor Coating of a Hydrophobic Thermosetting Synthetic Resin.** Sylvania Industrial Corp., assignee of R. T. K. Cornwell, both of Fredericksburg, Va., U.S.A.

United Kingdom

584,972. **Compositions Including Styrene.** Imperial Chemical Industries, Ltd.

584,989. **Curing Olefin-Diolefin.** United States Rubber Co.

585,033. **Stabilization of Vinyl Halide Polymer and Copolymer.** Wingfoot Corp.

585,060. **Heat-Convertible Adhesive Compositions.** E. I. du Pont de Nemours & Co., Inc.

585,065. **Aqueous Dispersions of Rubber and the Like.** B. B. Chemical Co., Ltd., L. E. Puddefoot, and K. J. George.

585,073. **Xylene-Styrene Condensation Product.** Dorman, Long & Co., Ltd., T. G. Woolhouse, and W. Lunn.

585,083. **Compositions Including Polymeric Materials.** Imperial Chemical Industries, Ltd., W. F. Smith, and H. G. White.

585,096. **Polymerization of Acrylic Acid and Derivatives thereof.** Imperial Chemical Industries, Ltd.

585,109. **Reacting Ketene and Hydrocyanic Acid.** Carbide & Carbon Chemicals Corp.

585,166. **Separation of Aromatic Hydrocarbons Having Conjugated Unsaturated Side Groups from Mixtures with Other Aromatic Hydrocarbons Having no Such Characteristics and Especially the Purification of Styrene, Indene, and Similar Compounds.** E. Mandel, H. Steiner, and S. Whincup.

585,205. **Curing Polymeric Materials.** Imperial Chemical Industries, Ltd., D. A. Harper, and W. F. Smith.

585,211. **Separation of Diolefins from Mixtures with Other Hydrocarbons.** J. C. Arnold (Standard Oil Development Co.)

585,215. **Stabilization of Vinyl Halide Copolymerization.** Wingfoot Corp.

585,232. **Recovery of Polymerized Olefin.** Carbide & Carbon Chemicals Corp.

MACHINERY

United States

2,416,348-349. **Machine for Molding Plastics or Other Moldable Material.** W. S. Renier, Milwaukee, Wis.

2,416,523. **Expansible Band-Building Drum.** U. C. Haren and V. H. Hasselquist, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,416,721. **Apparatus for Making Resinous Artificial Board.** C. A. Upson, assignor to Upson Co., both of Lockport, N. Y.

2,417,165. **Thermoplastic Material Extruder.** V. Jacobson, Hastings-on-Hudson, N. Y.

Dominion of Canada

439,709. **Apparatus for Applying Ribbons of Adhesive to the Wrapper and the Middle Sole of a Force-Lasted Shoe.** J. S. Kamborian, West Newton, Mass., U.S.A.

United Kingdom

585,164. **Apparatus to Produce Continuous Sheet of Biaxially Oriented Organic Polymer.** Plax Corp.

UNCLASSIFIED

United States

2,416,657. **Hose Coupling.** H. W. Trevaskis, Solihull, Birmingham, assignor to Dunlop Rubber Co., Ltd., London, both in England.

2,416,967. **Self-Sealing Pipe Coupling.** P. E. Thompson, Worcester Park, assignor to Sterling Industries, Ltd., London, both in England.

2,417,449. **Tire Inflation Indicator Valve Cap.** P. Rubin, Shamokin, Pa.

2,417,468. **Stripping a Flexible Polymer Insulation from a Wire.** V. J. Canziani, Brooklyn, and F. W. Stellwagen, Richmond Hill, assignors to Fairchild Camera & Instrument Corp., Jamaica, all in N. Y.

2,417,752. **Anchoring Device for Attaching an Emergency Anti-Skid Device to an Automobile Wheel.** W. A. Hayes, Denver, Colo.

2,417,952. **Tire Carrier for Vehicles.** J. Selzer and S. C. Johnson, Fort Wayne, Ind., assignors to International Harvester Co., a corporation of N. J.

2,417,985. **N,N' - Dibenzylidene - Ethylene - Diamine as Arachnicides.** E. C. Ladd, Passaic, N. J., assignor to United States Rubber Co., New York, N. Y.

2,417,988. **Apparatus for Measuring Surface Roughness.** M. Mooney, Lake Hiawatha, N. J., assignor to United States Rubber Co., New York, N. Y.

Dominion of Canada

439,706. **Viscosimeter.** K. Fisher, Bridge Valley, Pa., U.S.A.

439,715. **Wheel Rim for Tires.** E. Pelletier, St.-Ambroise, P. Q.

439,817. **Fastener for Securing the Links of Laminated Driving Belts.** H. Brammer, Leeds, York, England.

439,958. **Electric Cable Stripper.** T. Atherton, Salford, Lancaster, England.

440,060. **Coupling for Pipes Composed of Flexible Material, as Rubber having Walls Incorporating Metal.** H. A. Kemlo, London, and J. L. Thompson, Laleham-on-Thames, Middlesex, executors of the estate of I. S. Winby, deceased, in his lifetime of London, co-inventors with J. C. Williams, Slough, Buckingham, all in England.

440,183. **Tire Rack.** F. L. Sargent, Burlingame, and W. J. Crader, Mountain View, both in Calif., U.S.A.

440,204. **Apparatus for Evacuating Fluid from a Pneumatic Tire and Filling the Tire with Liquid.** Wingfoot Corp., assignee of W. W. McMahan, both of Akron, O., U.S.A.

United Kingdom

584,996. **Arrangement for Closing Hot Water Bottles and Other Containers.** St. Helens Cable & Rubber Co., Ltd., and A. J. Ensor.

585,019. **Cycle Tire Inflaters.** James Cycle Co., Ltd., and F. A. Kimberley.

585,101. **Automatic Guns.** Dunlop Rubber Co., Ltd., and H. W. Trevaskis.

585,105. **Pipe Couplings.** Compression Joints, Ltd., and G. A. Millard.

585,150. **Couplings for Cables.** Callender's Cable & Construction Co., Ltd., L. G. Brazier, and D. T. Hollingsworth.

TRADE MARKS

United States

427,795. **Durocote.** Rubber plastic-treated goods. Firestone Tire & Rubber Co., Akron, O.

427,796. **Match-Patch.** Tire and tube repair kits. J. W. Speaker Corp., Milwaukee, Wis.

427,842. **Horcolite.** Plastic-coated fabrics. Hodgman Rubber Co., Framingham, Mass.

427,855. **Wallfab.** Plastic wall covering. M. C. Gill, doing business as Peerless Plastic Products, Montebello, Calif.

427,873. **Mondur.** Synthetic resins. Monsanto Chemical Co., St. Louis, Mo.

427,918. Representation of two black bands containing the words: **"York White."** Ground limestone used as a filler in making rubber goods. R. E. Carroll, Inc., Trenton, N. J.

427,921. **Plasticord.** Plastic covered thread. M. R. White, Chester, N. Y.

427,922. **Plasticlad.** Plastic covered thread. M. R. White, Chester, N. Y.

427,934. **Servicised.** Rubber kneeling pads. A. C. Fischer, doing business as Servicised Products Co., Chicago, Ill.

427,949. **Raymix.** Surface coating flock. Rayon Processing Co. of R. I., Inc., Central Falls, R. I.

427,963. **Miraglo.** Simulated leather. Gold Seal Importers, Inc., New York, N. Y.

427,964. **Cocksure.** Garters, suspenders, and arm bands. Gem-Dandy, Inc., Madison, N. C.

427,965. **Leathofane.** Artificial leather. Kalix Mills, Cambridge, Mass.

427,966. **Pampoonies.** Footwear. Nevelk Co., Hallowell, Me.

427,970. Representation of a man on horseback with the words: **"Rough Riders."** Footwear. Cannon Shoe Co., Baltimore, Md.

427,971. Representation of a man on horseback. Footwear. Cannon Shoe Co., Baltimore, Md.

427,983. **Vylura.** Leather substitute. M. C. F. Mfg. Co., Peabody, Mass.

427,998. **Chemclad.** Plastic coated cordage. Carolina Industrial Plastics Corp., Mount Airy, N. C.

Rims Approved and Branded by The Tire & Rim Association, Inc.

Rim Size	Mar., 1947
15" & 16" D. C. Passenger	
16x3.50D	1,813
16x4.00E	448,591
16x4.50E	337,293
15x5.00E	157,837
16x5.00E	8,385
16x5.00F	31,018
15x5.50F	66,974
16x5.50F	6,413
16x6.00F	6,110
16x4.00E—Hump	307,047
15x4.50E—Hump	51,095
15x5.00F—Hump	25,925
15x5-K	26,776
16x5-K	132,513
16x5½-K	14,484
15x6-L	23,588
16x6-L	94,620
15x6½-L	30,073
17" & Over Passenger	
18x6-L	1,361
Truck	
20x3.75P	2,296
17x4.33R	28,754
20x4.33R	46,941
17x5.0	13,145
20x5.0	8,595
15x5.00S	12,508
20x5.00S	265,341
15x6.0	609
20x6.0	100,308
20x6.00S	29,260
15x6.00T	2,012
18x6.00T	144
20x6.00T	70,808
24x6.00T	1,608
20x7.0	2,841
15x7.33V	650
18x7.33V	428
20x7.33V	35,520
22x7.33V	5,217
24x7.33V	1,302
19x8.37V	807
20x8.37V	1,628
24x8.37V	3,822
24x10.00W	111
Semi D. C. Truck	
15x5.50F	28,272
16x5.50F	17,109
16x6.50H	776
Tractor & Implement	
12x2.50C	4,865
12x3.00D	32,368
15x3.00D	6,073
16x3.00D	9,158
18x3.00D	5,775
19x3.00D	17,904
21x3.00D	1,411
24x3.00D	938
36x3.00D	2,670
20x4.50E	8,900
36x4.50E	1,086
16x4.75K	4,034
18x5.50F	12,312
20x5.50F	14,536
24x6.00S	3,022
24x8.00T	3,075
32x8.00T	878
36x8.00T	1,014
40x8.00T	861
W6-30	226
W8-24	10,738
W9-24	963
W9-38	2,126
W10-24	1,294
W10-28	9,814
W10-36	4,653
DW9-38	5,360
DW10-38	7,058
DW11-24	8,364
DW11-26	530
DW11-28	2,011
Tractor & Implement	
DW11-36	2,647
DW11-38	12,457
DW12-30	1,953
DW12-34	1,559
Earth Mover	
24-15.00	228
Total	2,655,589

GOOD ODOR TIPS THE SCALES TOWARD BETTER RUBBER SALES

When the choice between your rubber product and another hangs in the balance, *better* rubber odor weights the decision. Assure sales-compelling odor appeal for rubber goods and rubberized fabrics the easy, swift and economical way with Givaudan's PARADORS*.

PARADORS are available in a wide variety of odor types, and special odorants can be developed for the most exacting individual requirements, either to mask processing odors or to impart specific and enduring effects in the final product.

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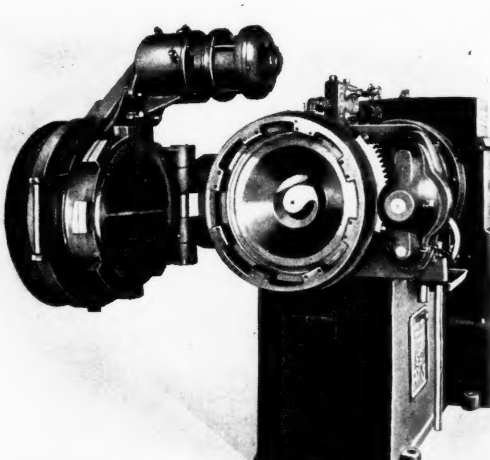

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Less time lost in cleaning and changing screens. . . .

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JOHN ROYLE & SONS

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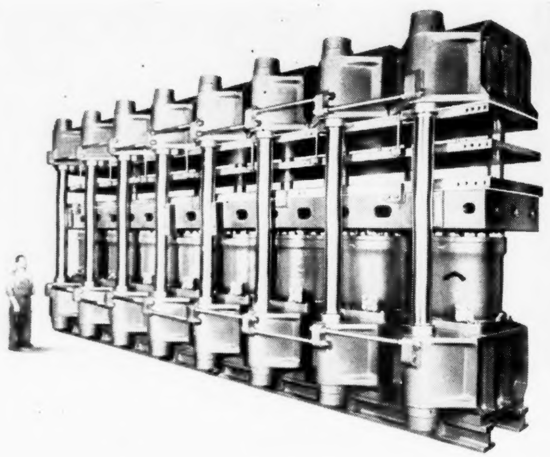
REgent 2430	SHerwood 2-8262	JEfferson 3264	LOgan 3261

PATERSON 3, NEW JERSEY

New Machines and Appliances



R. D. Wood Co.'s New 3,400-Ton Platen Press

Two-Opening Multiple-Cylinder Platen Press

A NEW two-opening, multiple-cylinder type, hydraulic steam platen press, designed for vulcanizing rubber composition sheet packing or floor tile, is the latest addition to the "Press Family" of the R. D. Wood Co., Philadelphia, Pa. A 3,400-ton press, it is also adaptable for vulcanizing rubber belting merely by adding stretching and clamping units, mounted at the ends to maintain proper belt tension.

Top and bottom platens are fabricated from eight heavily ribbed, close grained Meehanite castings, of sectional construction and rigidly connected to maintain proper alinement. The bottom platen is mounted on Meehanite I-beam foundation rails. The one-piece moving platen is made from an open-hearth steel casting with heavily ribbed box-section construction. Movement is guided on the four center columns by half-round, bronze-bushed Meehanite guide bearings, and on the four end columns by flat bronze bearings to assure proper adjustment when compensating for expansion and contraction of platen under changing temperatures.

Columns are of forged steel, and the cylinders are open-hearth steel castings with bronze-bushed guiding throats. The steam

FOR FURTHER DETAILS, SEE AD ON PAGE 154

platens are made of special process firebox steel plate, machined parallel within 0.003-inch, with one end of each platen tapered and water cooled. The intermediate steam platen is column guided, suspended by means of steel hanger rods and accurately spaced with the press in open position. This two-opening press can be furnished complete with steam and hydraulic piping and control valves. To meet product requirements, other sizes and capacities can be furnished.

Black Rock Rubber Cutter

Bench-Type Guillotine Cutter

THE Black Rock 4-MB bench-type guillotine cutter, designed specifically for cutting cured and uncured rubber stocks of square, rectangular, round, or irregular cross-sections to length, has been announced by the Black Rock Mfg. Co., 175 Osborne St., Bridgeport 5, Conn. This cutter will handle all cured rubber or rubber-like materials which are not more than 1¼ inches in diameter and three inches wide and will give cutting lengths up to a maximum of 3¾ inches. It will handle practically all uncured rubber or rubber-like stocks, except those that are extremely soft. Under such conditions a special cutting block can be furnished which will permit the cutting of virtually all soft stocks.

Although the machine is hand fed, the roller-type stop used permits rapid operation, and cutting rates up to 500 cuts per minute can be obtained. The machine operates on a 1/3-h.p. single-phase motor, which is connected to a 110-volt, 60-cycle line, and is regulated by a control switch. The cutting mechanism consists of a double-edge knife, a die, and a safety guard. Special or alternate equipment includes cutting blocks for soft stocks and extra dies. The machine is 22⅝ inches high, 20¾ inches deep, and 13 inches wide, and has a net weight of 275 pounds.

More Plastics for the Ukraine; More Bicycle Tires in Belgium

An extensive campaign for the production of plastics in the Ukraine is said to be now under way, which provides for the erection of 18 new factories in this area in 1947. At least one plant, a casein plastics factory at Dniopropetrovsk, is said to have started operations already.

The production of bicycle tires has been increasing at such a rate that Belgian manufacturers are now in a position to fill practically all domestic requirements, and it is consequently expected that rationing of bicycle tires may shortly be discontinued. Progress is also being made in the production of automobile tires and the stage is rapidly being reached where supply will meet demand. Natural rubber has now completely replaced synthetic rubber in the manufacture of tires in Belgium.

EUROPE

GREAT BRITAIN

I.R.I. Holds Annual Dinner

The annual dinner of the Institution of the Rubber Industry, February 28, was attended by a large number of guests, marking the twenty-fifth anniversary of the Institution. In the course of speeches by Sir Walrond Sinclair, immediate past-president of the I.R.I., and Howard Franklin, just reelected president for a second year, it was revealed that the Institution has given its support to the setting up of a National College of Rubber Technology and that many individual rubber manufacturers as well as the Federation of British Rubber Manufacturers have promised financial support. For the time being, at least, the new National College is to be associated with the Northern Polytechnic, which has for so many years provided outstanding rubber training. This arrangement is not considered ideal from the standpoint of location, but under the circumstances the fact that such a college is to be established at all is held to be the prime factor.

After his speech the president presented the Colwyn Gold Medal to George Martin for his valuable work in connection with the various problems of rubber production that came to his attention in his capacity, first, of superintendent of Rubber Investigation for Malaya and Ceylon, and later (after the formation of the London Advisory Committee for Rubber Research in Ceylon and Malaya) as superintendent of the work at the Imperial Institute, London. Mr. Martin, after thanking the president, touched briefly on the future of the Malayan rubber industry. In his opinion the production of smoked sheet was more suited to a cottage industry than a scientifically organized industry, and it was his aim, he said, to stop the production of smoked sheet and to have growers produce a new type of rubber which he was developing, which promised advantages both in cost and quality.

That the innovation aimed at by Mr. Martin is a dry rubber produced from latex was mentioned in his speech by F. D. Ascoli, who added that if the new method proved successful, it would be vital to the industry.

Another speaker, Sir Wallace A. Akers, director in charge of research, Imperial Chemical Industries, Ltd., discussed the importance of research in industry. He said that the total amount of money spent in the United Kingdom for this purpose, including research organizations, was about £25,000,000, which is not enough. The quality of research in the United Kingdom was good, he asserted, but the quantity needed to be stepped up, and he urged people to increase their research work.

Dunlop to Train Rubber Workers

Dunlop Rubber Co., Ltd., recently started a new type of training for young rubber workers. Each year a maximum of 12 boys 16-18 years old will be taken on at Fort Dunlop and given three years of general training, including 19 months on practical work in the engineering and tire production workshops and 17 months in technical and administrative departments. In addition courses will be followed at one of the technical colleges in Birmingham on one whole day or two half-days a week and two evenings a week.

When the student has completed his three years, he will be eligible for a special course of up to two years, which includes work in one of the company's divisions as junior assistant, with pay on the usual hourly basis, and study at a technical or commercial college.

According to a survey by a Dunlop official, wheels with 16-inch diameter rims are most frequently used on British cars. There is, however, a certain trend toward a 15-inch rim. On eight and 10 h.p. and some higher priced models, the 17-inch rim is popular. One car manufacturer uses only 18-inch rims, while still another prefers a 19-inch rim for his sports model.

Notes on the British Rubber Industry

John Bull Rubber Co., Ltd., Leicester, manufacturer of rubber goods including tires and tubes, recently opened an important extension to the works' laboratories.

The Tire Manufacturers' Conference, Ltd., limited by guarantee and without share capital, was recently formed to safeguard and promote the interest of manufacturers, sellers, distributers, and users of tires in the United Kingdom or elsewhere in British countries. The organization starts with an original membership of 50, each being liable for £1 in the event of winding up. The subscribers are: Avon India Rubber Co., Ltd., Bergougnan Tire Co., Ltd., British Tire & Rubber Co., Ltd., Davies Tire Co., Ltd., Dominion Rubber Co., Ltd., Dunlop Rubber Co., Ltd., Firestone Tire & Rubber Co., Ltd., Goodyear Tire & Rubber Co. (Great Britain) Ltd., Henley's Tire & Rubber Co., Ltd., India Tire & Rubber Co., Ltd., Michelin Tire Co., Ltd., North British Rubber Co., Ltd., Pirelli, Ltd., and John Bull Rubber Co., Ltd.

Recently it was reported in the British press that a lack of carbon black of a type produced almost exclusively in the United States was interfering with the manufacture of rubber goods and that several rubber factories had had to be put on a reduced schedule. It was feared that large-scale stoppages of work in the rubber industry and dislocations in industries it serves threatened unless larger quantities could be quickly obtained from the United States. It had therefore been suggested that a delegation representing employers and workers be sent to the United States to urge American producers to rush the shipment of larger amounts of carbon black to the United Kingdom.

An agreement between the Rubber Proofed Garment Manufacturers' Association and the Waterproof Workers' Union provides for a 44-hour week instead of the former 47-hour week, without reduction of pay. A five-day week is to be introduced, and both time and piece workers are to be guaranteed a wage of 80% of the minimum weekly time rates.

At the general annual meeting of the Waste Rubber Merchant's Association of Great Britain held in London in March, the chairman stated that the Association was urging the complete removal of all control over waste rubber. In the subsequent discussion on the subject it developed, however, that decontrol was being delayed because the Rubber Directorate was still doubtful whether reclaimers' requirements for natural rubber scrap to the end of 1948 would be met, and because certain high grades, as red automobile tubes, were in short supply.

Monsanto Chemicals, Ltd., is reopening its Manchester sales office, which has remained closed since shortly after the outbreak of the war.

The British Rubber Producers' Research Association announces that J. Wilson has resigned as director of research and that Geoffrey Gee, has been appointed as from April 1, 1947.

The post of head of the technological department of the British Rubber Producers' Research Association recently vacated by E. Rhodes, has been offered to C. M. Blow, known for his work on rubberizing wool. It may be recalled that while investigating the problem at the Wool Industries' Research Association for the Rubber Growers' Association, Dr. Blow developed and patented "Positex," a positively charged latex which deposits on a negatively charged woolen fiber in a manner analogous to that of a substantive dye. Dr. Blow also did research work at John Bull Rubber Co., Ltd., on rubber to metal bonding, on problems involved in the changeover to synthetic rubber during the war, and on the physical properties of rubber in connection with its application in engineering. At the B.R.P.R.A. he will continue work already begun there. This, incidentally is Dr. Blow's second connection with the BRPRA.

P. B. Cow & Co., Ltd., Streatham Common, London, S.W.16, has announced that T. W. Fazakerley, for the past five years general manager of the company, with which he has been associated about 16 years, has been named to the board of directors.

FRANCE

Michelines Again on the Road

In the mountainous territory of the Clermont-Ferrand district, Michelines are again providing the regular transportation service which had to be discontinued during the war partly because of the shortage of tires, but more particularly because of the lack of gasoline. The Michelines, it may be recalled, are the pneumatic-tired vehicles designed to run on rails as well as on ordinary roads. They were developed by the Michelin concern, which first began to experiment with them in 1929. The first Micheline was demonstrated to a group of directors of France's most important railway in 1931. By the time the war broke out, regular services with Michelines had been established in

various parts of France and also in the French colonies—Madagascar, French East Africa, Mozambique, and Indo-China. In the colonies several Michelines continued to run throughout the war, and one of these was reportedly used as Command Post by General Clark during the operations following the landing in North Africa, especially during the Tunisian campaign.

The latest type of Micheline perfected before the war was known as a "100-passenger" vehicle, but actually it could seat 96 persons and had standing room for 40 more. It is 30 meters long, weighs 19 tons empty and 28 tons loaded, and has a maximum speed of 130 kilometers per hour. The body is supported by two carrying bogies, each having four sets of axles; a third, central bogie acts as tractor and is connected to the frame by means of radius rods, one on each side of the bogie.

Rubber, in other forms besides pneumatic tires, plays an important part in the construction and efficiency of the Michelines. The so-called Bibax elastic joints, in particular, are largely responsible for the comfortable and relatively silent movement of these vehicles. Each of the carrying bogies has a centrally located pivot for keeping the cab in position, and each pivot is provided with a Bibax joint having torsion, compression and shear action, and distinguished by great lateral flexibility with relatively low vertical flexibility; two rubber abutments, one on each side of the Bibax, limit its movements. Bibax joints are mounted on the axles to bring them back to their normal position when the movement of the vehicle turns them aside; on the motor bogie the Bibax insures elastic connection between the (friction) rollers supporting the cab and the cross-pieces of the chassis. The motor itself is mounted on four rubber shock absorbers. The radius rods connecting frame and tractor bogie have Bibax articulations at their extremities. Finally, a special type of Bibax coupling connects two vehicles; it consists of a metal frame attached to the body of the vehicle and a cylindrical element of steel gripped by a rubber annulus several centimeters thick.

Constant improvement of the rail-tire has greatly increased its life, which from an original 12,000 kilometers rose to 35,000 kilometers by 1939. Incidentally, efforts to overcome the tendency of the rubber tires to slip on wet rails led to the development of the Michelin lamellar non-skid tread "Stop." In this tire the tread has lamellar projections which sweep or wipe away the film of water when a car is started or stopped.

Work on further improving the Michelines is continuing. A new bogie having five sets of axles instead of four is being tested in Algiers. The advantage of the new bogie is expected to be the possibility of eliminating the need of stopping the vehicle to change a wheel when a tire is deflated. These bogies will be used also on other experiments with lightweight trains of six carriages each. Three types of trains will be tested, the first to be of ordinary steel, the second of stainless steel, and the third of light alloys.

High Polymer Congress at Strasbourg

Through the aid of the Rockefeller Foundation the National Center of Scientific Research was able to organize a high polymer congress at the University of Strasbourg from November 25-30. Strictly speaking, this was not an international congress, but a meeting restricted to certain eminent scientists, including experts from France, United States, Great Britain, Holland, Sweden, and Switzerland. J. Le Bras represented the Institut Français du Caoutchouc. The papers presented included:

"X-Ray Research on the Structure of Chain Molecules," R. T. Astbury, University of Leeds, England.

"Thermodynamics of Solutions of Chain Molecules," M. L. Huggins, Kodak Research Laboratories, Rochester, N. Y., U.S.A.

"Statistical Thermodynamics of Polymeric Solutions," G. Gee, British Rubber Producers' Research Association, England.

"Incompatibility and Separation of Macromolecules," Mme. Dobry-Duclaux, Institut de Biologie Physico-Chimique de Paris.

"On the Statistics of Chains with Interactions and Steric Hindrances," M. Benoit, University of Strasbourg.

"Method of Interpretation of the Properties of Solutions Containing Chain Molecules in a Highly Diluted State," C. Sadron, U. of Strasbourg.

"Transfer Diffusion," M. Gibert, Faculty of Sciences of Clermont-Ferrand.

"Transfer Diffusion," M. Calvet, Faculty of Sciences of Marseille.

"Ultracentrifugation of the Salts of Glycol-Cellulose Acids," A. Banderet, Ecole de Chimie de Mulhouse, (France).

"Sedimentation in the Ultracentrifuge," Per-Olof Kinnel, Upsala, Sweden.

"Flow Birefringence in Polydisperse Media," R. Singer, director of the Institut de Chimie, University of Berne, Switzerland.

"Diffusion of Light in Solutions of Chain Molecules," P. Doty, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

"Viscosity of GR-S Solutions," M. Magat, Sorbonne, Paris.

"Statistical Thermodynamics of Gels of Polymers," G. Gee.

"Theory of Elasticity," M. L. Huggins.

"Swelling of Reticulated Polymers," P. Doty.

"Deformation of Cellulosic Gels," J. J. Hermans, University of Groningen (Holland).

"Solvation and Swelling of Cellulosic Derivatives," G. Champetier, director of the Laboratories of Paints and Varnishes, C.N.R.S. Paris.

"Crystalline and Amorphous States in Cellulose Fibers," P. H. Hermans, Utrecht, Holland.

"Aging of Nitrocellulose Solutions," J. Chedin, Laboratoire Central des Services Chimiques de l'Etat, Paris.

"Mechanism of Dispersion," M. Mathieu, Laboratoire Central des Services Chimiques de l'Etat, Paris.

"Supersonic Action on Macromolecules," P. Grabar, Institut Pasteur, Paris.

French Rubber Statistics

France imported 44,098 tons of natural rubber in the first nine months of 1946; of this, local consumption accounted for 17,777 tons. In addition 28,610 tons of synthetic rubber entered the country (798 tons of Buna from Germany, and 27,812 tons of GR-S from the United States); consumption of synthetic rubber was 418 tons of Buna and 23,108 tons of GR-S. After May, 1946, practically no Buna was imported, and shipments of GR-S also showed a progressive decrease from the maximum of 8,866 tons imported in March. September arrivals of GR-S were only 1,373 tons. On the other hand, consumption of GR-S remained fairly constant at around 2-3,000 tons a month.

French manufacturers produced 11,000 tons of reclaim during the first nine months of 1946. Output of finished goods included pneumatic tires and tubes of all kinds to a total of about 48,000 tons, of which about 36,000 tons were automobile tires. In addition French rubber factories produced about 5,500 tons of hose and piping, 3,700 tons of belting, 3,800 tons of footwear, 10,000 tons of soles and heels, 1,000 tons of surgical and sanitary goods, 6,800 tons of mechanical goods and 1,200 tons of ebonite.

French Rubber Industry Notes

At the last meeting of a committee of the Association of Doctors-Engineers of France, the society's Grand Medal was awarded to J. Le Bras, director of the research center of the Institut Francais du Caoutchouc. This honor is accorded by the association to any member who has especially distinguished himself by scientific works having application in the rubber industry and who constantly publishes scientific and technical articles capable of contributing to the prosperity of the national industry.

French Dunlop, Montluçon has completed the restoration of its main tire fastory at a cost of about 200,000,000 francs. Tire production has been increasing rapidly; in 1946 it was 80% of the prewar figure, and it is expected to equal that of 1938 before long.

A recently invented float for salvaging wrecks in French ports consists of an enormous rubber balloon reinforced with steel cables. The new device, which operates in more or less the same manner as the usual metal chests employed for the purpose, has the double advantage over the latter of being very much lighter and easier to transport.

GERMANY

Output of Buna rubber has been resumed at the Chemical Works Huels, Marl, in the British zone, recent press reports state, and the rubber manufacturing industry is now one of the very few industries in that zone with adequate supplies of raw material. The present output of Buna at the above factory is said to be 800 tons a month, against 1,500 tons in 1941. The chief manufactures produced in the British zone are tires, of which 15% is used by military, and the bulk exported. In addition to tires, a large variety of other goods (16,000 different items, it is claimed) is made in this zone.

Buna manufacture in the Russian zone is reportedly on a far larger scale than in the British zone, and the largest enterprise at Schkoppau in this zone is understood to produce about 2,000 tons a month.

The rubber industry in Leipzig, formerly well known for the variety of mechanical and surgical goods it produced, is again becoming active, it is learned, and Buna and Igleit (polyvinyl chloride) are the main raw materials used. Among the concerns that have resumed the manufacture of rubber goods in this city is Vulkan-Gummiwarenfabrik Weiss & Baessler, now operating with a staff of 30 to produce its specialties including surgical soft rubber goods and heels and soles.

The Union Rheinische Kraftstoff A.G., at Wesseling, near Cologne, has been permitted to produce monthly 1,500 metric tons of methanol for use as solvent and in organic synthesis.

From Wiesbaden comes the news that the Hanau factory of the German Dunlop company is to produce 21,000 automobile tires for Sweden from raw materials to be supplied by a Swedish firm.

Following a recent announcement, goods from the British and American zones in Germany may be imported by United Kingdom firms.

FAR EAST

CEYLON

Handicapped by increased labor costs, no longer aided by high wartime prices, and facing sharper competition for markets from Malaya and Netherlands India, rubber cultivation in Ceylon is in an uneasy position at present, and the government, keenly alive to rubber's importance in Ceylon's economy, is taking steps to strengthen the industry. Some months ago a commission was appointed to investigate the industry and to make suggestions regarding: the maximum acreage which could be profitably or economically worked in Ceylon; the possibilities of processing rubber before export; the development of the rubber export trade; and the necessary steps toward developing a rubber manufacturing industry here.

Meanwhile plans are already being discussed for the establishment of a state laboratory which would undertake research on the possibilities of partly processing rubber for export and would also test locally made rubber goods and advise rubber manufacturers. Further to aid home industry, especially in the production of bicycle tires, which had received considerable stimulus from the demands of the war, the government has decided to reduce import duties by 5% on the *ad valorem* duty on various items as cycle tire fabric, machinery and other equipment for cycle tire factories, and various ingredients including carbon black, zinc stearate, stearic acid, etc.

Among the steps being taken to increase the export of crude rubber two may be mentioned: an intensive sales campaign has been started in India where the ambitious plans being considered for the development of home industries, including the manufacture of rubber goods, offer Ceylon the opportunity of largely participating in supplying the expected increased demand for rubber; then it is also hoped to be able to arrange an exchange of rubber for textiles with Russia. The Ceylon Government's representative in the United Kingdom is reported to have the intention of going to Russia to survey such an exchange.

E. Rhodes, formerly head of the technological department of the British Rubber Producers' Research Association, has been appointed director of research, Rubber Research Scheme, Ceylon.

MALAYA

Notice has been received of the new organization of the Straits Settlements, Malay States, etc. The areas involved have been divided into: Colony of Singapore, Malayan Union, Colony of North Borneo, State of Brunei, and Colony of Sarawak. The Colony of Singapore includes Singapore Island, Christmas Island, and Cocos Island, hitherto part of the Straits Settlements. The Malayan Union includes the four former Federated Malaya States (Perak, Selangor, Negri Sembilan, and Pahang); the five former Unfederated Malay States (Johore, Kedah, Perlis, Kelantan, and Trengganu); and the former Settlements of Penang (including Province Wellesley) and Malacca. The Colony of North Borneo includes the former British North Borneo; and Labuan, hitherto part of the Straits Settlements. The State of Brunei includes Brunei, hitherto included with the Unfederated Malay States; while the Colony of Sarawak includes Sarawak.

Though the International Rubber Regulation Agreement came to an end in 1943, Rubber Regluation Enactments restricting new planting of rubber in Malaya continued on the statute books. Recently, however, came the announcement granting total exemption from all provisions in the legislature which prohibit the planting of rubber in Malaya.

Japan is to receive about 2,000 tons of rubber from Malaya every month in exchange for Japanese textiles and other manufactured goods. It is explained that the rubber is to be shipped to Japan to enable her to pay reparations.

The first postwar shipment of Malayan rubber went to the Soviet Union early in March when, following an arrangement between the President of the Singapore Chinese Chamber of Commerce and Soviet trade representatives made last December, the Russian ship *Komiles* arrived in Singapore and took on 3,100 tons of rubber from Singapore and Penang.

AFRICA

The managers of six widely separated retail stores for Bata footwear in the Belgian Congo set about reestablishing their business when cut off by the war from their sources of supply and, incidentally, gave the territory a new industry. Together the six young men worked out a plan for starting a shoe factory in the Congo although they did not have capital, materials, machinery or even adequate technical knowledge. The difficulties they had to overcome were many and serious for they even had to learn, with the aid of a text-book and experience, how to tan the leather they required. Eventually they trained natives to make leather shoes and before long were able to fill military orders. By the time the war ended, the enterprise had a staff of 60 white persons and 1,000 natives, and the number of retail stores had increased from six to 16. Subsequently a workshop was set up for the manufacture of plimsolls with locally produced textiles and rubber as the basic materials. The Congo concern is now an independent company known as the S. A. Bata Congolaise. It has concluded its military contracts and is now concentrating on the production of civilian footwear with the aim of eventually supplying the entire native population of the Congo with leather and rubber footwear from its own workshops.

Outside of the main Far Eastern rubber-producing countries, Liberia is now the largest exporter of rubber. In 1946 the republic shipped to the United States 13,865 long tons of rubber and 6,790 tons of latex.

Editor's Book Table

BOOK REVIEWS

"Introduction to the Chemistry of the Silicones." Eugene G. Rochow. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Cloth, 9 by 6 inches, 144 pages. Price, $2.75.

This volume is designed to offer the chemist, engineer, and industrial designer a compact and comprehensive survey of our present knowledge in the field of silicone chemistry. The first few chapters give rather detailed discussions of the silanes and their derivatives in order to provide a basis for understanding the fundamental chemistry of the non-silicate compounds of silicon. The later chapters emphasize the silicone polymers which have achieved commercial importance and deal with their methods of preparation, their chemical and physical properties, and their possible applications.

Subjects covered are: simple covalent compounds of silicon; organosilicon monomers; types of organosilicon polymers; properties of the specific silicone polymers; water-repellent films from organosilicon materials; technical aspects of silicones; and analytical methods. The chapter on specific polymers includes a rather brief discussion of silicone rubbers, covering methods of preparation, processing, and properties of the cured elastomer. An extensive glossary of chemical terms is appended together with an adequate index.

"Plastics Molds—Design, Construction, Use." Third Edition. Gordon B. Thayer. Huebner Publications, 506 Fairmount-Cedar Bldg., Cleveland 6, O. Cloth, 9 by 6 inches, 272 pages. Price, $5.

This enlarged and revised edition of a work already accepted as the standard manual on its subject will be of inestimable value to all concerned with the design, construction, or use of plastics molds. As a basic presentation, this book fills an important void in the industry and should provide a start in the right direction toward solving every-day molding problems.

Following an introductory chapter on definitions, requirements, types and factors, and a chapter on suggestions for design procedure, there are chapters dealing with practical points in mold design and construction; materials for plastics molds; types of molds for compression molding; design of a simple compression-type mold; design of a split cavity compression-type mold; design of a side-opening compression-type mold; design of a transfer-type mold; design of a simple injection-type mold; design of a stripper-plate injection mold; design of a loose-bar injection mold; injection mold for a plastics lens; loading the injection mold; ejector systems for injection molds; mold building methods and equipment; methods of mold sinking; finishing methods and equipment; molding screw threads in plastics; hard chromium plating for the plastics industry; plastic tooling; and estimating plastic molds.

Besides the author's work, the text includes experiences and case histories by individual contributors that provide authenticity to the book. Appendices include shrinkage charts for molded plastics, an extensive glossary of plastics molding terms, and an adequate index.

"The Chemical Process Industries." R. Norris Shreve. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. Cloth, 9 by 6 inches, 966 pages. Price, $8.

This highly commendable volume gives the chemical engineer a broad picture in a generalized form of all the various chemical processes. The author has endeavored and succeeded in presenting the subject of industrial chemistry from the chemical engineering viewpoint, through the correlation into flow sheets and descriptive text of the chemical and physical changes and reactions, the economic statistics and posts, and the energy and power requirements. As such, the book should be especially valuable to the student in bridging the gap between fundamental theory and engineering and the practical use of this knowledge in industry. Modern factory practice is closely followed throughout the volume, with actual industrial procedures given, illustrated by 128 tables and more than 200 flow sheets, with important integrated material on raw materials, equipment, costs, markets, etc., and with typical problems to be worked out in order to test comprehension of the principles involved in each industry.

The first three chapters discuss objectives of the book, unit processes and unit operations, and general fundamentals. Succeeding chapters are each devoted to a given process industry and include a brief introduction, some review of the history or background of the process, a consideration of uses and econom-

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(Classified Advertisements Continued on Page 279)

ics, a description of manufacturing procedures, which includes energy changes, unit operations and unit processes, a discussion of raw materials sources, costs, and interrelationships, one or more test problems, and a bibliography of selected references. Among the 36 or more industries so discussed are the industrial carbon, plastics, and rubber industries. Although the latest references are those of 1943, the information provided in the chapters are such as to provide an adequate background on the processes, materials handling, costs, and correlation with other industries. Comprehensive author and subject indices are appended.

NEW PUBLICATIONS

Publications of the Columbia Chemical Division, Pittsburgh Plate Glass Co., Fifth Ave. at Bellefield, Pittsburgh 13, Pa. **"General Compounding Data of Silene EF and GR-S Formulations."** Columbia Pigments Data Sheet No. 47-1. 24 pages. Some 44 formulations for Silence EF and GR-S are given herein, together with extensive laboratory data and charts on physical properties of the vulcanizates with various curing cycles. Evaluations of various accelerators and plasticizers in these formulations are also included. **"Effect of Ethylene Glycol on Silene EF and Natural Rubber Compositions."** Columbia Pigments Data Sheet No. 47-2. 4 pages. Test results are presented on the effect of ethylene glycol on Silene EF and natural rubber compositions at both 20 and 40 volume loadings of Silene EF. Four formulations are used, and data listed for various curing cycles. **"Data on Silene EF in Natural Rubber."** Columbia Pigments Data Sheet No. 47-3. 4 pages. Data are offered on the effect of different loadings of Silene EF in natural rubber. It is shown that high-volume loading stocks possessing good strength and physical properties can be prepared, and that a wide range in physical properties can be obtained by using mixtures of Silene EF and Calcene T.

"Farrel-Birmingham Equipment News." Bulletin No. 24-R-471. Farrel-Birmingham Co., Inc., Ansonia, Conn. 4 pages. This latest issue of the company bulletin contains illustrations and descriptions of a new belt vulcanizing press, a mill specifically designed for processing asphaltic tile, and a mill, calendar, and blanking unit for phonograph record stock.

"Associated Engineers." Associated Engineers, Inc., 230 E. Berry St., Fort Wayne 2, Ind. 16 pages. This illustrated brochure describes the activities of the company, as consultants, and the facilities of its workshops. Individual sections are devoted to the company's services to management, in business administration, industrial engineering, mechanical engineering, architectural and structural engineering, and the company's facilities for research, study and production.

"B. F. Goodrich Paint Spray Hose." Catalog Section 4280. The B. F. Goodrich Co., Akron, O. 2 pages. This leaflet illustrates and discusses the company's hose for paint spray and paint spray air lines. Constructions of the hose are shown, and tables give sizes, weights, number of braids, outside diameters, and maximum working pressures.

Publications of the Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago 80, Ill. **"Indonex Rubber Plasticizers,** Properties and General Compounding Data." Bulletin No. 13, revised March 6, 1947. 23 pages. The properties of the four grades of Indonex plasticizers appear in this bulletin, and their versatility and general effectiveness are shown by means of test results comparing them with other softeners in the compounding of GR-S, neoprene, natural rubber, nitrile rubbers, Butyl, and reclaimed rubbers. **"Indonex in Butyl Rubber Compounds."** Circular No. 13-1. 3 pages. **"Indonex in Butadiene-Acrylonitrile Copolymer Compounds."** Circular No. 13-2. 4 pages. **"Indonex in Neoprene Compounds."** Circular No. 13-3. 11 pages. **"Indonex in Tire Carcass Compounds."** Circular No. 13-4. 5 pages. **"Indonex in Footwear and Heel Compounds."** Circular No. 13-5. 4 pages. **"Indonex in Camel Back."** Circular No. 13-6. 3 pages. **"Indonex in Motor Mount and Bumper Compounds."** Circular No. 13-7. 5 pages. **"Indonex in Wire Jacket and Other Extruded Compounds."** Circular No. 13-8. 4 pages. **"Indonex in GR-S Packing Compounds."** Circular No. 13-9. 4 pages. **"Indonex in Hose Compounds."** Circular No. 13-10. 4 pages. **"Indonex in Hard Rubber Compounds."** Circular No. 13-11. 3 pages.

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(*Classified Advertisements Continued on Page 285*)

"Heat Transfer Properties of Philblack-A in Natural Rubber." Philblack Bulletin No. 4, dated March, 1947. Philblack Division, Phillips Petroleum Co., Akron, O. 3 pages. Results of thermocouple and Goodrich flexometer studies of Philblack-A's heat transfer properties are given, compared with zinc oxide in natural rubber at equal volume loadings. The data show Philblack-A to give the same heat transfer as zinc oxide in natural rubber under both static and dynamic conditions, except for the 33 volume loading under dynamic conditions. In addition, Philblack-A imparts better physical properties to natural rubber at tire operating temperatures.

"Neoprene Type NC, General Purpose Elastomer." Report No. 47-2. February, 1947. N. L. Catton. E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 8 pages. Descriptions and typical formulations are given for Neoprene Type NC, an elastomer which in the uncured state is resistant to rapid mill breakdown and thermal softening. These properties make it valuable for making products such as thin-walled extruded goods, which must retain their shape during processing operations, and for large sized hose and low durometer molded goods.

"Specifications for Government Synthetic Rubbers. Revision Supplement Effective April 1, 1947." Office of Rubber Reserve, Reconstruction Finance Corp., 811 Vermont Ave., Washington 25, D. C. 7 pages. This supplement adds a specification on chemical stabilizer for many of the GR-S polymers and narrows the Mooney viscosity range of the vulcanizates. Specifications for GR-I-15 are added, and modulus requirements for GR-I vulcanizates are also given. The revisions for GR-M and GR-M-10, effective May 1, show the reduction in number of plasticity grades and add Mooney viscosity requirements for the different grades. In the section on testing, revisions are given for aging of test stocks, dimensions of testing equipment, curing and testing methods, and determination of total solids.

"Baldwin Sonntag Impact Machines." Bulletin 253. Baldwin Locomotive Works, Philadelphia 42, Pa. 4 pages. Illustrations, specifications, and descriptive information are given in this bulletin for the Sonntag SI-1 impact tester, claimed to be the first such tester on the market to have sufficient rigidity and accuracy for testing the higher strength plastics. The machine is designed for testing plastics in the capacity range from two to 48 foot-pounds, with adequate precision in all ranges.

"Polyvinyl Methyl Ether, PVM." Data Bulletin No. 110, dated April 1, 1947. General Aniline & Film Corp., 247 Park Ave., New York 17, N. Y. 8 pages. Polyvinyl methyl ethers are described in this bulletin, with information given as to their general properties, and properties and compatibilities in aqueous solutions and in organic solvents. The material has been used abroad as a heat sensitizer for synthetic rubber latices. The company's laboratories have found it effective in natural rubber latex and in some of the commercial synthetic rubber latices. Some information, including formulations, is given on use of the material as a latex heat sensitizer. The material is also suggested for use as an adhesive coagulating agent, as a plasticizer, and as a sizing agent for textile, leather, and paper products.

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Market Reviews

Members of Commodity Exchange, New York on May 1 Awaiting the Gong Signalizing Resumption of Crude Rubber Futures Trading Suspended Since the War

CRUDE RUBBER

Commodity Exchange

THE Commodity Exchange, Inc., New York, was scheduled to resume crude rubber futures trading on May 1 for the first time since February 6, 1942. The standard contract to be traded calls for delivery at New York of 10 long tons, or 22,400 pounds, ribbed smoked sheets of *Hevea* plantation rubber in four grades, of which No. 1 is basic. No. 1X grade, a superior smoked sheet, is tenderable at 20 points above basic grade price; No. 2 grade is tenderable at a discount of 50 points; and No. 3 is tenderable at a discount of 100 points. A point in the trading will be 0.01¢ per pound. First delivery month to be traded will be September, 1947, and the futures market will cover each succeeding month up to and including July, 1948.

The customary limitation of 2¢ a pound on daily price fluctuations in crude rubber fixtures will be suspended for the first day of trading, May 1, in order to allow futures prices to adjust to the present spot price. The limitation will be restored May 2. The required original margin on trading has been set at $900 per contract, the Exchange's board of governors announced. The minimum margin required on "hedge" purchases or sales is $600 per contract, and for "straddles" $200 per contract.

The resumption of futures trading will give importers and traders the necessary mechanism to hedge their positions during the time shipments are afloat or have not been resold by them. Futures trading was not resumed on April 1 because it was decided to first allow the market some time to find its own new level. This policy will effectively block any possible argument that speculative influences had any voice in establishing the post-decontrol rubber price level.

New York Outside Market

THE first month of resumed rubber trading on New York Outside Market was featured by relatively firm prices in a quiet market. Spot and nearby deliveries were in greatest demand, with distant positions relatively unchanged. A persistent demand was noted for the latex grades, of which little was offered. Factory demand, after getting off to a slow start, stiffened noticeably during April owing to the liberalization of end-use controls, the expected extension of inventory limits to 90 days rather than the present 60-day limit, and the alinement of the larger consumers' purchasing programs. In general, factories were pursuing rather cautious purchasing programs, and the larger consumers appeared to be buying heavily in the Far East through direct agents.

At present liquidating some 45,000 tons of crude rubber at 25.75¢ a pound through an agreement between the RFC and the major rubber consumers, the government is expected to start selling another 110,000 tons at 23¢ a pound as soon as the initial 45,000 tons are sold. Private traders preparing to meet this competitive challenge, pointed out that spot prices in the free market were below the 25.75¢ level. On the basis of present free market conditions, admittedly far from stable, the traders believe they can cut the government out of a substantial part of its potential market.

The government price of 23¢ for the second lot of 110,000 tons will be quoted ex dock or ex warehouse for the basis grade No. 1 ribbed smoked sheets. Of the initial 45,000 tons, traders estimated that only about 5% was No. 1 grade, and this percentage may also apply to the 110,000-ton lot. To this price must be added freight charges based on goverment calculated averages. In addition, smaller consumers without inspection and preparation facilities will be forced to channel their government purchases through private facilities, thereby adding 0.125-025¢ per pound to their original buying price. The government price, with all charges included for the 110,000 ton-lot would therefore come to about 23.75¢.

Another factor tipping the scale toward the free market is the question of grade selection. In the past, buyers of government stocks have found it difficult to secure the grades of rubber they need and have been forced to accept mixed lots which are detrimental to the production programs of many small consumers. In the short time since free trading has been reestablished, traders report far better success than the government in securing these better quality stocks and are therefore prepared to make more attractive offerings.

The 23¢ level set by the government will act as a ceiling on free market prices, depending upon the availability of government stocks and the various grades. Inventory controls are also expected to put a damper on over-buying of crude, and the end-use limitations will serve as an additional restraint. Some larger companies have indicated their intention to purchase the government stocks before relying on the priva mark, and such tactics may depress private buying until the end of August.

Fixed Government Prices*

	Price per Pound
Guayule	
Guayule *(carload lots)*	$0.17½
Latex	
Normal *(tank car lots)*	.30¾
Centrifuged *(tank car lots)*	.32½
Plantation Grades	
No. 1X Ribbed Smoked Sheets	.25¾
1X Thin Pale Latex Crepe	.25¾
2 Thick Pale Latex Crepe	.25¼
1X Brown Crepe	.24⅝
2X Brown Crepe	.24⅜
2 Remilled Blankets (Amber)	.24½
3 Remilled Blankets (Amber)	.24⅜
Rolled Brown	.21¼
Synthetic Rubber	
GR-M (Neoprene GN)	.27½
GR-S (Buna S)	.18½
GR-I (Butyl)	.18½
Wild Rubber	
Upriver Coarse (crude)	.12⅝
(Washed and dried)	.20¼
Islands Fine (crude)	.14⅝
(Washed and dried)	.22½
Caucho Ball (crude)	.11⅝
(Washed and dried)	.19½
Manaheira (crude)	.08½
(Washed and dried)	.18

* For a complete list of all grades of all rubbers see Rubber Reserve Co. General Sales and Distribution Circular, July 1, 1945, as amended.

New York Outside Market Closing Prices

	April 1	April 3	April 11	April 18	April 25	April 30
No. 1 Ribbed Smoked Sheets						
April	24.00	24.25	24.00	24.00	24.50-25.50	24.50-25.50
May	23.25	24.00	23.50	23.50	23.75	23.125-23.75
June	23.00	23.50	23.00	23.125	23.125	23.00-23.125
July	22.50	23.00	22.75	22.875	23.00	22.875-23.00
August	22.50	22.75	22.50	22.625	22.625	22.75
September	22.50	22.50	22.25	22.375	22.375	22.50
October-December	22.25	22.25	22.00	22.50	....	....
No. 2 Brown (June)	21.75	21.75	21.25	21.25	21.25	20.75
No. 3 Amber (June)	21.625	21.625	21.25	21.25	21.25	20.75
Flat Bark	....	19.00	18.50	18.50	18.50	18.25
Thick Latex Crepe	33.50	35.00	34.00	35.00	35.00	....
Thin Latex Crepe	....	....	34.00	35.00	35.00	..

SCRAP RUBBER

THE scrap rubber market developed no activity during April, and dealers reiterated the fact that there is no business of any consequence in the present dull situation. While some tires and tubes were going in small shipments to certain reclaimers, most dealers were still working under old commitments, and new orders are not expected until the market picture is clarified. Some export business is said to exist, but even here the pace has slowed down. Difficulties encountered in foreign exchange and the financial problems of shipping to the Orient or to South America were said to account for the recession of export trade.

As far as tire parts are concerned, dealers say that here the picture is bleakest. There are no outlets for peelings these days, it is said. There may be a call for natural rubber peelings once in a while, but the synthetic and recap grades are at a standstill. The high freight rate on scrap rubber precludes shipment from remote areas. As the nominal price of mixed tires is $17 per ton, delivered Akron, shippers have from $2 to $7 per ton left after deducting freight, and southern dealers find it impossible, therefore, to market much of their lower priced scrap, such as tires.

Prices of scrap rubber were manifestly easier. With mixed tires delivered at Akron dropping from $19 to $17 per ton, eastern dealers who had been quoting at $17.50 indicated that their price specifications were subject to change. As for tube scrap, few outlets exist, and Akron dealers were down to 4.25¢ per pound, from the former price of 5.125¢, and eastern dealers were paying 4.5¢, instead of the previous 5.5¢. Beadless tires in the East rose from $23 per ton to $24.

Following are dealers' buying prices for scrap rubber, in carload lots, delivered points indicated:

	Eastern Points	Akron, O.
	(Net per Ton)	
Mixed auto tires	nom.	$17.00
Truck and bus tires	nom.	nom.
Beadless tires	$24.00	25.00
S.A.G. passenger (natural)	17.50	18.00
(Synthetic)	nom.	nom.
Truck (natural)	15.50	16.00
(Synthetic)	nom.	nom.
No. 1 peelings (natural)	45.00	45.00
(Synthetic)	nom.	nom.
(Recap.)	nom.	nom.
No. 2 peelings (natural)	30.00	31.00
(Synthetic)	nom.	nom.
(Recap.)	nom.	nom.
No. 3 peelings (natural)	28.00	29.00
(Synthetic)	nom.	nom.
	(¢ per Lb.)	
Mixed auto tubes	4.5	4.25
Red passenger tubes	7.25	7.25
Black passenger tubes	6.25	6.25
Truck tubes	6.0	6.0
Mixed puncture-proof tubes	2.0	2.0
Air brake hose	nom.	nom.
Rubber boots and shoes	nom.	nom.

RECLAIMED RUBBER

THE reclaimed rubber market continued to be favorable, with both high production and high demand, but an uneasy undertone is becoming more marked with each week. Fear exists that Congress in writing the laws to continue the government's synthetic rubber program may involuntarily discriminate against the reclaim industry. Competition from plastics and synthetic rubber already exists against reclaim, and it is feared that a decrease in price of GR-S, possibly through government subsidies, may upset the reclaim market entirely. The increasing influx of crude rubber has been viewed with some concern by the reclaimers as a threat to price stability, and the recently announced intention of the RFC to liquidate some 155,000 tons of rubber from the government stockpile has served to aggravate this threat.

Writing in the *Waste Trade Journal*,[1] Jean H. Nesbit, president of U. S. Rubber Reclaiming Co., said that there is every reason to expect an active demand for scrap on the part of the reclaimers this year. He estimates a 1947 reclaim production of about 300,000 long tons, which will require about 383,681 long tons of scrap rubber, computed at 1946 scrap consumption rates.

Final January and preliminary February statistics on the reclaimed rubber industry are now available. Final January figures show a reclaim production of 25,545 long tons, consumption of 27,715 long tons, exports of 1,443 long tons, and end-of-month stocks of 30,053 long tons. Preliminary February figures show a production of 23,998 long tons, consumption of 25,620 long tons, exports of 1,142 long tons, and end-of-month stocks of 27,289 long tons.

Prices for reclaimed rubbers showed a general increase of 0.5¢ per pound during April as a consequence of increased labor costs and higher freight charges. These increases are included in our reclaimed rubber market listing this month, which has also been revised and brought up to date to show current standard grades.

[1] Mar. 29, 1947, p. 131.

Reclaimed Rubber Prices

	Sp. Gr.	¢ per Lb.
Whole tire	1.18-1.20	8 / 8.5
Peel	1.18-1.20	9 / 9.5
Inner tube		
Black	1.20-1.22	12.75 / 13.25
Red	1.20-1.22	13.5 / 14
GR-S	1.18-1.20	9.5 / 10
Butyl	1.16-1.18	8.5 / 9
Shoe	1.50-1.52	8.25 / 8.75

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

COTTON AND FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

Futures	Feb. 22	Mar. 29	Apr. 3	Apr. 12	Apr. 19	Apr. 26
May	33.05	36.00	35.33	34.48	35.60	36.30
July	31.20	34.30	33.48	32.50	33.68	34.14
Sept.	29.30	32.09	31.44	30.47	31.12	31.45
Nov.	27.89	30.50	29.98	29.06	29.33	29.64
1948						
Jan.	27.19	29.72	29.23	28.37	28.53	28.87
Mar.	27.02	29.55	29.07	28.30	28.25	28.59

THE cotton market fluctuated irregularly during April and was characterized by a general undertone of uneasiness. After an early decline, prices stabilized and rose sharply toward the end of the month, only to fall again as April drew to a close. The 15/16-inch middling spot price started the month at 36.52¢, dropped to the low of 34.92¢ on April 14, rose to the month's high of 37.35¢ on April 22, and closed the month at 35.87¢. Paralleling these fluctuations, the July futures price began the month at 34.10¢, dropped to the April 14 low of 32.25¢, rose to the April 22 peak of 34.78¢, and ended the month at 33.30¢.

Factors influencing the downward trend of the market were: (1) declining mill demand owing to high cloth prices and cloth market inactivity, and July mill consumption expected to fall off sharply; (2) speculative liquidation in anticipation of call date; and (3) an increase in hedge selling against spot sales, and further mill hedging against inventories. Optimistic factors affecting the market included: (1) the feeling among traders that the market had been oversold during the early part of the month; (2) reports that American cotton would be used to rebuild the Japanese textile industry to its 1930-34 level, and estimations that a minimum of 1,250,000 bales of cotton would be sent to Germany and Japan during the next season; (3) continued delays in southern cotton planting because of inclement weather; (4) the Commodity Credit Corp. announcement of purchases of 40,000 bales of cotton for UNRRA; (5) the tight supply situation for the season's end, with the carryover estimated at less than 3,000,000 bales for August 1; and (6) optimism based on the labor agreements in the steel and other industries.

The Bureau of the Census announced that domestic mills consumed 875,124 bales of cotton during March, as against 840,463 bales in February and 804,290 bales in March, 1946. A survey estimated that 20,617,000 acres would be planted in cotton this spring, an increase of 13.4% over 1946 final acreage. Another development of the month, expected for some time and received with resignation, was the Commodity Exchange Authority's order of April 3 limiting the individual speculative holdings in any one cotton futures market to 30,000 bales.

Fabrics

The industrial gray goods market was generally quiet during April, with brief flurries of activity in certain constructions. Spot prices were somewhat lower and were being sustained by the continuing active export demand. The price decline had the beneficial effect of removing the speculative buying movement from the market. Third-quarter sales were being made in certain fabrics, particularly the staple wide goods such as drills, but it was admitted that this business was not coming in so quickly as expected. No apprehension was expressed, and mills felt certain that the third-quarter position would be gradually filled. Large buyers in the rubber, automotive, and electrical industries were confining their purchases to about 90 days; while others were holding to as low as 30 days.

The 1946 production of all types of tire fabric and cord reached the record total of 522,000,000 pounds, exceeding the previous record established in 1945 by 14% and being about twice the 1939 output. Of this total production, 59% was cotton and 41% was rayon. Cotton tire fabric production last year broke all previous records, surpassing 1945 and 1939 levels by 11% and 45%, respectively. Cotton tire cord production in 1946, although exceeding 1945 output by 15%, was 24% below that of 1939. The 1946 annual production of rayon and nylon tire fabric and cord also reached a new high of 212,000,000 pounds, exceeding the 1945 output by 16.5% and being about 24 times the 1939 level of the two types, current production is understood to be almost entirely rayon, with nylon usage being nominal at present.

CLASSIFIED ADVERTISEMENTS

Continued

MACHINERY AND SUPPLIES FOR SALE (Continued)

FOR SALE: NEW SCOTT RUBBER TENSILE TESTER, MODEL L-7, equipped for elevated temperature testing with a ½ h.p. 110-volt 60-cycle motor and automatic recorder. List price with extras $2275; sell $1200 F.O.B. Borger, Texas. J. M. HUBER CORPORATION, 342 Madison Ave., New York 17, N. Y.

FOR SALE: 1—BAKER-PERKINS SIZE 15, 100-GAL. JACK. MIXER; W & P 9-gal. double-arm Mixer, Stokes RD4 Rotary Preform Tablet Machines, 1-3/16" dia., also 5/16" & 7/16"; New 40-gal. Pony Mixers; Farrel 16" x 48" 2-Roll Rubber Mill; Large Stock Hydraulic Presses from 12" x 12" to 42" x 48" platens from 50 to 500 tons; Hydraulic Pumps & Accumulators; Injection Molding Machines; Mixers; Grinders; Kettles; etc.

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STEIN EQUIPMENT CO.
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ONE 4 FT. X 12 FT. BOLTED AND HINGED DOOR VULCANIZER open steam. Available immediately. BROADWAY RUBBER MFG. CO., INC., Louisville 2, Ky.

FOR SALE: 1, 300-TON, H-P-M OPEN ROD, VERTICAL, UPWARD-Acting Molding Press with H-P-M Rubber Turbojector. Includes electrically heated hot plates and temperature controller. This unit has never been used. Write for more detailed information. Address Box No. 858, care of INDIA RUBBER WORLD.

FOR SALE: MANUFACTURER OFFERS 6 AMERICAN TOOL rubber spreaders, fully enclosed, good condition, slightly used, 45" roll face, 18 feet length. Address Box No. 864, care of INDIA RUBBER WORLD.

MACHINERY & SUPPLIES WANTED

ONE No. 9 BANBURY MIXER IN GOOD CONDITION, ADDRESS Box No. 845, care of INDIA RUBBER WORLD.

WANTED TO BUY—ONE USED LABORATORY BANBURY AND one used laboratory extruder for insulated wire. Both should be in good condition. Write giving complete description of units and motor and price. Address Box No. 846, care of INDIA RUBBER WORLD.

EQUIPMENT WANTED: MIXER PLASTICS BANBURY #1 OR 1A-steam jacketed-bottom discharge with pneumatic charging ram. Mills Rubber Horizontal 16" x 30" Water Cooled—Speed Diff. 10%—50 H.P. Drives. Calenders—2 Roll Vertical—30" wide x 20" rolls—25 H.P. Vari. Drive. Current—440—60—3 Phase—Slight Variations from specifications acceptable. Equipment must be in A-1 condition. Please send all replies in duplicate to Box No. 848, care of INDIA RUBBER WORLD.

WANTED: ONE NO. 3A BANBURY MIXER IN GOOD CONDITION. Address Box No. 857, care of INDIA RUBBER WORLD.

WANTED: REFINER IN GOOD CONDITION. STATE PRICE, FULL details, length and diameter of both rolls and ratio of speed. Address Box No. 862, care of INDIA RUBBER WORLD.

RAYON

DOMESTIC rayon shipments during March totaled 78,200,000 pounds, a figure 12% above the February level of 70,000,000 pounds and 4% over that of March, 1946. For the first three months this year, deliveries of rayon amounted to 224,900,000 pounds, 8% greater than corresponding 1946 period shipments. Rayon stocks held by producers at the end of March showed only nominal changes from those held at the end of February, and continue at low levels. At the end of March, producers held 4,900,000 pounds of viscose and cupra yarn, 1,900,000 pounds of acetate yarn, and 2,500,000 pounds of staple.

Rayon staple imports for consumption have risen steadily during recent months. January imports amounted to 5,770,000 pounds, the second largest month on record. Imports during February totaled 4,326,000 pounds, or three times the volume imported during February, 1945. Total 1946 rayon staple imports for consumption amounted to 33,808,000 pounds and were received from 11 foreign countries.

Annual 1946 production of rayon, nylon, silk and related broad woven fabrics reached a new record total of 1,811,000,000 yards, exceeding the previous peak in 1944 by 7%. Last year's production of 100% rayon filament yarn fabrics was 1,048,000,000 pounds, a slight increase over 1945, but 15% below the record 1941 output. The production of 100% spun rayon fabrics exceeded 1945 and 1939 levels by 17% and 7.5%, respectively.

Compounding Ingredients—Changes and Additions

Abrasives

Pumicestone, powdered	lb.	$0.03⅔	$0.05
Rottenstone, domestic	ton	36.00	43.00

Accelerators, Organic

Accelerator 8	lb.	.75	
Polyac	lb.	1.40	
Triphenylguanidine (TPG)	lb.	.45	.50
Vulcanex	lb.	.45	

Accelerator-Activators, Inorganic

Lime, hydrated	ton	8.50	12.14
Litharge, commercial	lb.	.166	.175
Red lead, commercial	lb.	.176	.185
White lead, basic	lb.	.1525	.175
Zinc oxide, commercial	lb.	.095	.1275

Accelerator-Activators, Organic

Barak	lb.	.60	
Lead oleate	lb.	.1725	
Stearic acid, single pressed	lb.	.36	.37
Double pressed	lb.	.375	.385
Triple pressed	lb.	.4025	.4125
Zinc stearate	lb.	.54	.55

Antioxidants

Akroflex C	lb.	.58	.60
Copper Inhibitor X-872-L	lb.	1.50	
Neozone (standard)	lb.	.66	.68
A	lb.	.43	.45
C	lb.	.47	.49
D	lb.	.43	.45
Distilled	lb.	.48	.50
Parazone	lb.	.68	
Permulux	lb.	1.53	1.55
Solux	lb.	1.48	1.50
Thermoflex	lb.	1.48	1.50
A	lb.	.70	.72

Antiseptics

Copper naphthenate, 6-8%	lb.	.21	
Zinc naphthenate, 6-10%	lb.	.1975	.24

Blowing Agents

Ammonium bicarbonate	lb.	.0675	
Carbonate	lb.	.0825	.105
Unicel	lb.	.60	
ND	lb.	1.00	

Bonding Agents

MDI	lb.	$7.25	$7.75
—50	lb.	3.60	3.85
Ty-Ply Q, S	gal.	6.75	8.00

Colors

Blue

Du Pont	lb.	.945	3.95

Green

Chrome oxide	lb.	.30	.33
Du Pont	lb.	1.10	3.20

Orange

Du Pont	lb.	2.50	3.35

Red

Cadmium red lithopone	lb.	1.10	1.50
Du Pont	lb.	1.65	1.80
Iron oxide	lb.	.0675	.1025

White

Lithopone, titanated	lb.	.0725	.0825
Zinc oxide, commercial	lb.	.095	.1275
Zinc sulfide, commercial	lb.	.10	.1075

Yellow

Chrome	lb.	.26	.276
Du Pont	lb.	1.48	1.95

Dusting Agents

Mica	lb.	.0625	.0675
Zinc stearate	lb.	.54	.55

Fillers, Inert

Asbestos fiber	ton	21.50	65.00
Blanc fixe, dry, precip.	ton	67.50	100.00
Lead sulfate, basic	lb.	.1525	.155
Lithopone, commercial	lb.	.055	.065
Mica	lb.	.0625	.0675
Whiting, limestone	ton	10.50	27.50

Finishes

Wax, bees	lb.	.59	.72
Carnauba	lb.	1.26	1.67

Latex Compounding Ingredients

Aquarex BBX Concentrated	lb.	.78	
D	lb.	.75	
MDL Paste	lb.	.32	
ME	lb.	.90	
SMO	lb.	.50	
pHR latex chemical	lb.	1.25	

Mold Lubricants

Aluminum stearate, precip.	lb.	.50	.57
Aquarex D	lb.	.75	
MDL Past	lb.	.32	
Sericite	lb.	.0625	.0675

Odorants

Vanillin	lb.	3.00	4.65

Plasticizers and Softeners

Barak	lb.	.60	
Calcium stearate	lb.	.52	.53
Lead oleate	lb.	.1725	
Magnesium stearate	lb.	.55	.56
Stearic acid, single pressed	lb.	.36	.37
Double pressed	lb.	.375	.385
Triple pressed	lb.	.4025	.4125

Reinforcers, Other Than Carbon Black

Clay, China	ton	9.00	16.00
Darex Copolymer No. 3	lb.	.395	.42
No. X 34	lb.	.45	.475
Magnesium carbonate	lb.	.0725	.1175
Zinc oxide, commercial	lb.	.095	.1275

Solvents

Benzol, industrial	gal.	.19	.24
Carbon bisulfide	lb.	.05	.085
Tetrachloride	lb.	.065	.095
Toluol, industrial	gal.	.22	.28
Xylol, industrial	gal.	.23	.42

Synthetic Rubbers

Neoprene Latex (dry weight)			
Type 60	lb.	.32	.37
571	lb.	.25	.30
572	lb.	.28	.33
601	lb.	.30	.35
700	lb.	.30	.35
842	lb.	.27	.32
Neoprene Type AC	lb.	.50	
NC	lb.	.35	

Vulcanizing Agents

Litharge, commercial	lb.	.166	.175
Red lead, commercial	lb.	.176	.185

Malayan Rubber Statistics

The following statistics have been received from Singapore by way of Malaya House, 57 Trafalgar Square, London, W.C.2, England.

Ocean Shipments from Singapore and Malayan Union—In Tons

To	February, 1947: Sheet and Crepe	Latex, Concentrated Latex, Revertex (Dry Rubber Content)
Argentine Republic	7,300	....
Australia	2,093	20
Belgium	1,748	52
Canada	6,338	3
Chile	188	....
China	4	....
Cuba	415	....
Cyprus	22	....
Czechoslovakia	540	....
Denmark	230	13
Egypt	73	2
Finland	450	10
France	20	23
Germany	1,785	....
Greece	70	....
Hong King	2,583	....
Italy	3,718	....
Japan	480	....
Mexico	2,605	....
Netherlands	1,138	22
New Zealand	67	....
Norway	686	5
Other British Countries in Asia	10	....
Palestine	28	1
Portugal	15	6
Spain	1,396	....
Sweden	1,960	20
Switzerland	16	10
Syria	8	....
Turkey	85	....
United Kingdom	14,125	562
Union of South Africa	179	....
U. S. A.	18,217	19
Venezuela	8	....
Yugoslavia (Trieste)	200	....
TOTAL	68,809	768

Foreign Imports of Rubber in Long Tons

	February, 1947: Dry Rubber	Wet Rubber (Dry Weight)	Latex, Etc.
Singapore Imports from			
Banka and Billiton	47	....	..
Brunei	201	3	..
Dutch Borneo	1,449	168	..
French Indo-China	55	....	..
Java	104	....	..
North Borneo	567	10	..
Other Dutch Islands	56	8	..
Rhio Residency	471	41	..
Sarawak	2,843	10	..
Siam	532	....	..
Sumatra	8,092	6,249	48
TOTAL	14,417	6,489	48
Malayan Union Imports from			
Burma	899	39	..
Siam	4,294	162	..
Sumatra	851	786	..
TOTAL	6,044	987	..

Dealers' Stocks—February, 1947

	Tons
Penang	14,094
Province Wellesley	4,005
Singapore	46,459
Up Country	54,215
TOTAL	118,773

Port Stocks—Lighters, Railway Godowns and Other Port Stocks—February, 1947

	Tons
Penang	6,503
Port Dickson	110
Port Swettenham	3,702
Singapore	19,939
Teluk Anson	615
TOTAL	30,869

Production—Malayan Union—February, 1947

	Long Tons
Estates	26,633
Small Holdings (estimated)	23,370
TOTAL	50,003

Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	February, 1947		February, 1946	
	Quantity	Value	Quantity	Value
UNMANUFACTURED				
Balata ....lbs.	1,807	$ 6,570	4,925	$ 4,283
Crude rubber ....lbs.	6,059,012	1,391,372	690,599	156,973
Latex ....lbs.	139,933	56,290	57,569	29,580
Rubber, powdered and waste ....lbs.	1,051,100	22,933	297,600	7,641
Recovered ....lbs.	2,264,000	156,703	2,722,900	198,774
Synthetic and substitute ....lbs.	404,800	98,453	340,600	98,569
TOTALS.	9,920,652	$1,732,321	4,114,193	$ 495,820
PARTLY MANUFACTURED				
Comb blanks of hard rubber	......	$ 2,560	......	$ ......
Hard rubber in rods or tubes ....lbs.	5,895	9,894	1,609	1,765
Rubber thread, not covered ....lbs.	4,506	3,886	4,064	3,972
TOTALS.	10,381	$ 16,340	5,673	$ 5,737
MANUFACTURED				
Belting	......	$ 56,882	......	$ 39,370
Boots and shoes of rubber, n.o.p. .....prs.	40,366	60,051	4,802	2,832
Canvas shoes with rubber soles ....prs	413	1,318	350	940
Cement		30,090		18,774
Clothing of waterproofed cotton or rubber	......	4,283	......	1,544
Druggists' sundries	......	36,065	......	26,563
Gaskets and washers	......	19,173	......	16,325
Gloves .... doz. prs.	1,979	7,949	1,709	6,623
Golf balls ....doz.	300	1,364	......	......
Heels ....prs.	2,778	524	3,456	298
Hose	......	40,344	......	28,864
Hot water bottles	......	6,774	......	2,908
Inner tubes, n.o.p. ...no.	798	2,674	223	942
Bicycle ....no.	854	331	400	272
Liquid sealing compound	......	11,643	......	13,028
Mats and matting	......	46,051	......	27,570
Nursing nipples ..gross.	1,150	3,557	730	2,445
Packing	......	9,090	......	11,463
Raincoats ....no.	3,504	14,101	......	......
Tires pneumatic, n.o.p. no.	1,143	32,911	148	6,624
Bicycle ....no.	1,040	1,340	588	1,044
Solid for automobiles and motor trucks no.	......	......	10	456
Other	......	3,038	......	1,188
Tire repair material	......	47,661	......	6,945
Other rubber manufactures	......	289,465	......	210,001
TOTALS	......	$ 726,619	......	$ 427,019
TOTAL RUBBER IMPORTS	......	$2,475,280	......	$ 928,576

Exports of Crude and Manufactured Rubber

	February, 1947		February, 1946	
	Quantity	Value	Quantity	Value
UNMANUFACTURED				
Crude rubber ....lbs.	1,132,617	$ 215,394	1,175,758	$ 190,156
Waste rubber ......lbs.	1,301,700	17,927	2,106,600	37,279
TOTALS.	2,434,317	$ 233,321	3,282,356	$ 227,435
PARTLY MANUFACTURED				
Soling slabs of rubber lbs.	19,011	$ 4,005	3,550	$ 1,272
MANUFACTURED				
Bathing caps	......	$ 248	......	$ ......
Belting, n.o.p. ......lbs.	206,900	130,792	229,551	132,466
Belts, fan	......	4,757	......	2,336
Boots and shoes of rubber, n.o.p. ......prs.	139,764	237,416	92,723	149,171
Canvas shoes with rubber soles ....prs.	176,002	187,622	73,202	62,793
Clothing of rubber and waterproofed clothing .	......	16,756	......	11,224
Heels ....prs.	73,488	5,773	80,748	7,011
Hose	......	71,293	......	44,246
Inner tubes for motor vehicles ....no.	49,867	126,062	28,252	82,676
Soles ....prs.	9,772	2,252	2,896	924
Tires, pneumatic for motor vehicles ...no.	41,520	649,479	26,306	534,631
Other ....no.	4,769	3,952	88	321
Wire and cable, copper, insulated	......	63,374	......	139,096
Other rubber manufactures	......	36,834	......	69,421
TOTALS	......	$1,536,610	......	$1,236,316
TOTAL RUBBER EXPORTS	......	$1,773,936	......	$1,465,023

Official statistics show that Italy's imports in the first half of 1946 included 3,113 tons of raw rubber, semi-finished and scrap and waste rubber, valued at 279,498,000 lire, in addition to 1,157 tons of rubber manufactures, gutta percha, and ebonite, with a value of 155,151,000 lire.

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